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THE PRESENT STATUS OF CARDIOVASCULAR SURGERY

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THERE has been remarkable progress made in the field of cardiovascular surgery during the past few years. This report concerns the clinical and experimental articles which have appeared during the period from January, 1949 to March, 1951 and have made a significant contribution toward the development of this field. An attempt has been made to co-ordinate and crystallize these reports. The material has been divided into four main categories.

1. Surgery of the heart
   a. Extracorporeal pumps
   b. Mitral stenosis
   c. Vascularization of the myocardium
   d. Cardiac septa, trauma, resuscitation, and pericarditis
2. Surgery of the great vessels
   a. Tetralogy of Fallot
   b. Patent ductus arteriosus
   c. Coarctation of the aorta
   d. Pulmonic and aortic valvular stenosis
   e. Mediastinal venous obstruction
3. The surgery of portal hypertension
4. Blood vessel grafts

1. SURGERY OF THE HEART

Although great advances have been made in the field of cardiovascular surgery, it is still not feasible to operate within a bloodless heart. The possibility of performing intracardiac surgery with the aid of hypothermia has been investigated by Bigelow and his associates. Hypothermia was induced in dogs and the shivering was controlled by anesthetic agents in order to study the physiology of the cardiovascular system and learn about the mechanism of death at low temperatures. It was possible to exclude the heart from the circulation for periods of 15 minutes at a body temperature of 20 degrees centigrade with survival. In a majority of the animals, the heart was opened and then sutured during the period of exclusion. This procedure was attended by a high mortality and the cause of death is not yet clearly understood. Periodic electrical stimulation of the phrenic nerve was utilized as a means of artificial respiration during the period of respiratory depression in the lower temperature ranges. An artificial pacemaker in the form of periodic electrical stimulation of the SA node area of the heart restored the heart action in instances of cardiac standstill in the cold state. Rewarming was accomplished by means of a water bath at 40 degrees centigrade. There was a gradual fall of the blood pressure, heart rate, and cardiac output to very low levels as cooling progressed, with a comparable rise upon re-warming. Venous pressures were a reliable guide to the cardiac status. Ventricular fibrillation usually caused death between 16 and 22 degrees centigrade.

A. Extracorporeal pumps. Other investigators using a different approach are attempting to develop a mechanical apparatus whereby the heart, lungs, or both can be by-passed. Stokes and Gibbon have developed such a machine. In 6 consecutive animal experiments, blood was continuously drawn from the venae cavae, passed through the apparatus and continuously returned to the animal by way of a peripheral artery, for periods varying from 40 minutes to more than 2½ hours. All 6 animals survived this procedure and showed no evidence of organic damage, either clinically or

at autopsy some months later. In other experiments, 8 dogs survived periods of complete occlusion of the venae cavae varying from 30 to 46 minutes. During occlusion, cardiorespiratory function was maintained by the apparatus. "The 46 minute period of occlusion of the venae cavae is, we believe, the longest reported during which the cardiorespiratory functions have been completely maintained by an extracorporeal circuit followed by survival of the animal."

Jongbloed also describes a mechanical heart which maintains the whole circulation to the brain, spine, liver, and kidney so that all the functions in the organism go on more or less normally. "We believe that our apparatus from a technical standpoint may be considered ready for a trial in man. The apparatus did not show any failure during its long hours of use."

A device which can be used to sidetrack one portion of the heart only has been constructed by Leeds, Gray, and Cook. The circulation is diverted from the superior vena cava to a pump and thence through the pulmonary artery to the left side of the heart. This should make the right side of the heart relatively bloodless, except for the coronary venous flow. A similar apparatus has been utilized by Sewell and Glenn. It is a simple perfusion pump with a maximum minute stroke volume of 4,700 cubic centimeters of water. This pump has been used successfully in the dog in place of the right side of the heart, the entire vena cava blood flow being shunted directly into the pulmonary artery.

Sirak, Ellison, and Zollinger have described an experimental method of shunting oxygenated blood around the left ventricle. This method permits the use of the animal's own lungs for oxygenation of the blood. Animals were sustained by this apparatus for as long as 20 minutes with the ventricle open in order to confirm the isolation of that chamber and the efficiency of the apparatus. Surviving animals had no undesirable sequelae.

B. Mitral stenosis. Although it is not yet feasible to perform bloodless intracardiac surgery upon the mitral valve, many surgical attempts have been made to correct mitral stenosis. Harken believes that the heart must not be dislocated from the position of optimum function during the surgery of mitral stenosis and that direct surgery of the mitral valve is more readily accomplished by approaching it from above through the auricle. Apparently, certain types of stenosis are better tolerated than others and the heart rate seems to influence the severity of a given lesion. On this basis, Harken describes different types of surgical procedures. In patients in whom the mechanical obstruction due to the stenotic valve was the outstanding feature, it was preferable to do a valvuloplasty, which allowed some possible return of function with a minimum burden of added regurgitation. In patients with marked mitral regurgitation, interatrial septal defects were created to decompress the left auricle and pulmonic bed. In patients so debilitated that they could not be considered for direct cardiac manipulation, and in patients who had episodes of tachycardia which produced pulmonary edema, cervicodorsal sympathectomy maintained a slower pulse rate and also eliminated various cardiopulmonary reflexes which might play a part in the production of pulmonary edema. In a more recent article, Harken described an operating tunnel which provided an opportunity for more deliberate, better controlled intracardiac manipulation.

Bailey, Glover, and O'Neill, however, believe that commissurotomy is a more simple, direct, effective, and safe procedure. It relieves mitral stenosis by restoring valve function without the production of additional mitral regurgitation. The most satisfactory avenue of approach is through the left auricular appendage. Still another variation is described by Smithy and his associates, who advocate a partial valvulectomy. The ventricular approach is preferred to the transauricular method because of the greater margin of safety in the control of hemorrhage, better surgical exposure, and satisfactory protection against arrhythmias due to the intramural administration of procaine. The clinical observations concerning 7 patients subjected to 8 operations are presented:

There were 2 deaths. "It thus becomes apparent that the eligibility of candidates for partial mitral valvulectomy is determined almost exclusively by the state of their myocardial reserve. We believe that patients whose hearts have not enlarged or failed under the burden of severe mitral stenosis should be but little embarrassed by a small degree of insufficiency."

A method has been described by Murray for the resection of a part of a stenosed mitral valve and for the insertion of an additional valve to prevent regurgitation. This procedure is performed through a cannula and is done partly under direct vision by means of a cardioscope. A new valve is fashioned by turning a vein inside out and placing a tendon through the new lumen for support. The operative approach is made through a small incision in the left ventricle. Ten patients have been operated upon in this manner and the results in 8 have been fairly satisfactory.

The ideal solution to the problem of mitral stenosis would be to fashion new and normal-func-

tioning valves surgically. Experimental reconstruction of the cardiac valves by means of venous and pericardial grafts has been performed by Templeton and Gibbon. Anatomically and functionally, the pericardium appeared to be more suitable than a vein as the source of the graft. Specimens of the graft obtained at autopsy after 3 weeks were viable and firmly united to the walls of the heart.

Other surgical procedures which attempt to alleviate the effects of mitral stenosis in a more indirect fashion have been described. Bland and Sweet record a procedure for the relief of acute pulmonary edema secondary to mitral stenosis in which an outlet from the high pressure pulmonary area into the systemic venous bed is created by means of an extracardiac shunt. The operation consists of anastomosing the dorsal segment branch of the right inferior pulmonary vein to the azygos vein. It was performed upon 6 patients and the subsequent improvement in the first 3 patients was remarkable. A significant reduction in the pressure in the left auricle occurred upon release of the shunt.

Cossio and Perianes describe three operations for the relief of marked pulmonary congestion: anastomosis of a pulmonary vein to the subclavian artery, or the splenic artery or its homonomous vein; tricuspid valvulotomy; and ligation of the inferior vena cava below the renal veins. The last 2 procedures were performed with immediate and dramatic improvement over a period of 6 months. "Drainage of a large proportion of pulmonary venous blood into the systemic circuit represents a physiological approach to the surgical management of the cardiac lung." The excessive blood discharged from the right ventricle reaches the general circulation directly from the lungs and pulmonary stasis improves.

A somewhat different approach has been made by Bill, Peirce, and Gross, who have attempted to circumvent a stenosed valve in dogs. A pathway is constructed from the left auricle to the left ventricle to by-pass the mitral valve, using a preserved segment of aorta from another animal and fitting it with a valve which is also taken from another dog. "Our early impressions lead us to think that it might be technically feasible to build such a channel from grafted vessels. Future progress in the construction of extracardiac shunts depends largely on the possibility of developing a mechanical valve mechanism which could be inserted in such a pathway."

Rappaport and Scott describe a method for creating an anastomosis between an atrium and its corresponding ventricle by turning down and implanting the opened auricular appendage into the ventricular cavity. The atrioventricular anastomosis allows the blood to flow in only one direction, from the atrium to the ventricle, and thus has valvular properties. Continuous intravenous administration of heparin after operation is necessary in order to prevent the formation of thrombi with obstruction of the anastomosis.

In many cases of mitral stenosis the patient succumbs as a result of peripheral arterial emboli which originate in the left auricle. In more than 90 per cent of the cases of rheumatic heart disease, the thrombi are located within the auricles, particularly in the auricular appendages. Burdette has safely removed the auricular appendage in dogs. All of the 16 dogs survived the first of 2 stages, and 1 dog died within 12 hours after the second stage of the bilateral auricular excision. Brunschwig and Robbins also have demonstrated that a portion of the auricle can be temporarily isolated by compression, and opened and closed by suture without apparent permanent disturbance. Experiments upon a series of dogs demonstrated the feasibility of removal of a large segment of auricular appendage without interruption of the normal heart action. Madden reports 2 cases in which resection of the left auricular appendage was done as prophylaxis for recurrent arterial emboli. The first patient survived and the second died. The only indication for the operation is the presence of rheumatic heart disease and mitral stenosis, with or without auricular fibrillation, in a patient who has had one or more recent peripheral arterial embolic occlusions.

Beal, Longmire, and Leake performed auricular appendectomy in 3 patients with rheumatic heart disease, auricular fibrillation, and peripheral embolic phenomena. Mural thrombi were demonstrated in each instance. There has been no recurrent embolization over a period of 3 to 8 months. Cardiac function was not apparently influenced by the operative procedure. Baronofsky and Skinner described 3 cases in which left auricular appendage ligation alone was performed, and it was suggested that ligation without excision be used as an additional surgical approach to the problem of recurrent embolization in rheumatic mitral disease.

C. Vascularization of the myocardium. There have been numerous attempts to improve the collateral circulation of the heart so that an effective procedure might be available clinically for cases of myocardial insufficiency. These attempts have centered about three general approaches (32): (1) interruption of the nerve supply of the heart, as illustrated by the work of Fauteaux, (2) re-

versal of the flow of the coronary sinus, with or without an arterial shunt, such as Beck has produced, and (3) formation of adhesions to other structures, and the omental grafts of O'Shaughnessy. Glenn and Beal became interested in the fate of a systemic artery implanted in the myocardium, and inserted the internal mammary artery into the myocardium of the left ventricle of dogs. The animals tolerated the procedure well, and microscopic sections revealed that the myocardium reacted only slightly to the systemic artery buried within its substance. The lumen of the implanted artery remained patent in spite of a rather marked intimal proliferation. Since this persisted for as long as 6 weeks after operation, and since small vessels were found in the region of the junction of the artery and myocardium, it may be postulated that blood is circulating through the vessel. It was feared that the implantation might result in hematoma formation and fibrosis, but this did not occur.

Vineberg and Niloff also described studies concerning the vascularization of the ventricular myocardium by means of left internal mammary artery implantation. An anastomosis was shown to occur between the internal mammary artery and the left ventricular circulation in from 50 to 73 per cent of the animals. The degree of protection against coronary occlusion varies according to the size of the anastomotic channels. When there is a large anastomosis, death and infarction from coronary occlusion do not occur. Thrombosis of the implant limits the size of the anastomosis. The operation is technically simple and does not appear to damage the heart.

Beck attempted to increase the total blood supply to the heart by grafting vascularized tissues to the surface of the heart, by converting the coronary sinus into an artery, and by bringing about the development of intercoronary channels. Intercoronary and extracoronary communications together reduced the mortality by one-half and also reduced the size of the infarct after ligation of the descending ramus of the left coronary artery. Arterial blood could be delivered to the coronary sinus by anastomosing the common carotid artery to the coronary sinus and by a free graft of vein between the aorta and coronary sinus. "It is important to tie off the coronary artery about 2 weeks after the anastomosis has been done. Preliminary ligation of the sinus also helps by making it thicker and easier to suture." In a later report, McAllister, Leighninger, and Beck stated that if a vein graft is inserted between the aorta and the coronary sinus and if the sinus is left open so as to create an aortic right auricular fistula, the procedure is well tolerated. Forty-seven consecutive animals were subjected to this procedure without mortality, and the grafts have remained patent in 65 per cent. This operation in itself furnishes some protection against occlusion of a major coronary artery. If, at a second stage, the coronary sinus is partially occluded, there is no further mortality and the grafts do not become thrombosed. This two-stage procedure has protected 12 of 13 dog hearts against experimental attempts to produce occlusion.

In the process of devising methods of vascularizing the myocardial capillary bed by arterialization of the cardiac veins, Stenstrom performed partial and complete coronary sinus occlusion, anastomosis between the carotid artery and the open and closed sinus, plus coronary artery ligation. Coronary sinus occlusion in the normal dog heart frequently produces hemorrhage, degeneration, and necrosis in the myocardium. Acute arterialization of the closed coronary sinus with reversal of the circulation with survival has not been accomplished. Simultaneous arterialization of the closed sinus plus ligation of the main left coronary artery has not been successful in preventing immediate death. "Gradual reversal of the circulation in the cardiac veins may be productive of more success."

Another type of experimental approach to the problem of increasing the collateral coronary circulation has been made by Carter, Gall, and Wadsworth. A technique for cardiopneumopexy is described in which asbestos powder is used as a means of producing vascular adhesions between the heart and lung. Comparison of specimens obtained from dogs in which ligation of the anterior descending branch of the left coronary artery had been performed after cardiopneumopexy with those from dogs in which ligation alone was done revealed less extensive infarcts and a lower mortality in the protected series.

D. Cardiac septa, trauma, resuscitation, and pericarditis. A method for exposure of the cardiac septa has been used experimentally by Dodrill. The right atrium or right ventricle is opened, the septa exposed for short intervals, and the incision closed. The instrument used has a ring clamp at one end, and it brings the lateral walls of the atria in apposition with the septum. The incision is made within the ring, which excludes the circulation from the area. The exposure of the ventricular septum is more difficult but it has been accomplished with the same instrument. It has also been possible to create under direct vision an auricular septal defect in dogs (72), but this defect has a strong tendency toward spontaneous closure. A procedure is described whereby anatom-

ical and functional obliteration of this experimental defect is accomplished by inversion of the auricular appendages.

In discussing wounds of the heart, Ravitch and Blalock report 7 consecutive cases with pericardial tamponade due to hemopericardium which were successfully treated by aspiration alone. Facilities for open operation should be prepared, but it seems that with most wounds that cause cardiac tamponade and which are not immediately fatal, aspiration alone will suffice.

Carter and MacMillan have devised means of excising portions of the entire thickness of the ventricular wall. This method has been used in 25 dogs, with an operative mortality of 12 per cent. There were no deaths due to technical failure, all of them being a result of ventricular fibrillation. Special emphasis is placed on the incorporation of the pericardium in a loosely placed continuous mattress suture for closure of the defect. No instance of late rupture through this area has been discovered nor has there been any case of aneurysm in this region.

In evaluating present day methods of cardiac massage, Johnson and Kirby studied the problem in dogs, using the bubble meter of Dumke and Schmidt to measure the rate of blood flow. The flow in the carotid artery and thoracic aorta increased as the rate of cardiac compression was increased from 30 to 120 times per minute. The rate of blood flow during cardiac massage was approximately one-half of that produced by the spontaneous heart beat with an open chest. Maximal rates of blood flow during cardiac massage could not be maintained without supporting the blood volume with liberal quantities of blood or physiologic saline solution. The rate of blood flow in the carotid artery during cardiac massage was significantly increased by occlusion of the thoracic aorta.

Concerning the surgical treatment of constrictive pericarditis, Holman believes that adequate pericardiectomy must include excision over the left ventricle, right ventricle and auricle, and over both venae cavae. The inferior cardiac border must also be liberated from the diaphragm. Persistence of ascites postoperatively is usually evidence of inadequate decortication and demands reoperation and removal of more scar tissue. A median sternotomy incision is used. In a later report, it is suggested that the insidious and progressive nature of tuberculous pericarditis requires operation at an earlier date than has been previously practiced. "It is strongly urged that when the diagnosis of cardiac compression can be made clinically, either in the stage of pericardial effusion or in the stage of pericardial contracture, there is great need of prompt cardiac decompression. In a very ill patient with pericardial effusion such decompression might be best effected by removal of the left sixth costal cartilage for evacuation and drainage of the pericardium followed at a second stage ten to twenty days later by median sternotomy and radical pericardiectomy."

2. SURGERY OF THE GREAT VESSELS

A. Tetralogy of Fallot. The surgical treatment for the tetralogy of Fallot is now well established. The short term results are good, but it remains to be seen whether the "artificial ductus" which is created will produce undesirable sequelae. Among the first 500 patients operated upon for congenital heart disease and cyanosis at the Johns Hopkins Hospital, there has been a mortality of 19.8 per cent (1). In the group of 358 patients in whom the preferred operation was done, namely, an end-to-side anastomosis of the subclavian to the pulmonary artery, the mortality was 12.6 per cent. The carotid or innominate artery is now rarely used. Thrombosis of the anastomosis is a rare complication, and for this reason anticoagulants are not used prophylactically. During the course of these operations for congenital heart disease, variations of the aortic vascular ring were encountered in 40 instances (2). The cases observed were one of three forms: (1) a subclavian artery which arises from the medial side of the aortic arch as the last branch and passes behind the esophagus to the arm contralateral to the side of the aortic arch; (2) a retroesophageal innominate artery; and (3) persistence of both right and left embryologic fourth aortic arches.

Potts prefers anastomosis of the aorta to the pulmonary artery and reports on a group of 181 patients who have been operated upon. The advantage of this procedure is that the anastomosis can be made any desired size. No patient is refused surgery if a diminished blood flow to the lungs can be demonstrated. Cooling the patient on the operating table appears to be beneficial because it decreases the consumption of oxygen. The over-all mortality was 12.7 per cent and the results were very satisfactory clinically.

There is some difference of opinion concerning choice of the side for approach in operations for the tetralogy of Fallot. Lam had the best results when the approach was made on the side of the apex of the heart, regardless of the age of the patient or the position of the aortic arch. Blalock prefers to enter the chest on the side opposite to the aortic arch except in very young patients or those in their late teens or older.

The general consensus is that the optimum time for operation in cases of congenital heart disease and cyanosis is between the ages of 5 and 10. According to Fell, the earlier operation is not indicated generally unless it is evident that the patient will not survive with conservative therapy. However, 3 patients, aged 7½ weeks, 10 weeks, and 5½ months, respectively, with severe increasing cyanosis due to congenital tricuspid atresia were successfully operated upon, and these cases led to the conclusion that "we have waited too long and have been influenced too greatly by authors who have stated that operation should not be done before the age of 2 years."

An unusual type of congenital heart disease which has been treated surgically by Blalock and Hanlon is that characterized by complete transposition of the aorta and pulmonary artery. Thirty-three patients were operated upon, and one of the following 3 procedures was performed in each: (1) some type of extracardiac shunt, (2) the creation of an auricular septal defect, and (3) a combination of these two procedures. The combined procedure has given the best results thus far. The majority of patients have survived the operative procedure, but the postoperative mortality has been high, most of the deaths being due to the poor general condition of the patients, to the use of procedures now considered unsound, or to surgical errors. Of the 12 patients treated by the creation of an auricular septal defect and an anastomosis between the right subclavian and pulmonary arteries, 8 are living with various degrees of improvement.

B. Patent ductus arteriosus. It has been stated frequently that there is a definite recurrence rate if a patent ductus arteriosus is merely ligated and not divided surgically. It is still questionable whether it is necessary in all cases to divide the ductus. Potts believes that the preferred operation is the division and suture technique. One clamp is used at each end of the ductus, and each is closed with 2 rows of continuous sutures. In another report (59), he describes the use of a newly devised thin clamp which decreases the danger of uncontrollable hemorrhage. Freeman, Leeds, and Gardner present a different technique, using a modified Potts clamp which permits complete control of the aortic end of the ductus. Through a pericardiotomy incision, the left pulmonary artery and the pulmonary end of the ductus are controlled. Blalock still prefers to utilize 2 through-and-through mattress sutures plus 2 purse-string sutures in tying off the ductus, and he does not feel that it is necessary to perform actual division of the ductus. Among 161 operations for patent ductus arteriosus performed by this suture-ligation technique at the Johns Hopkins Hospital, there has been no instance of recanalization (65). The suture-ligation technique, because of its simplicity and safety, is advocated for general application in preference to the "division" type of operation. It is certainly true that in the average surgeon's hands the operative risk is definitely increased if division is performed. According to Jones, there is not a single, universally ideal technique. Each patient should be considered an individual problem.

C. Coarctation of the aorta. Just as in the case of patent ductus arteriosus, the surgical treatment for coarctation of the aorta has proved eminently satisfactory. "In the vast majority of subjects, it is possible to remove the aortic block and obtain relief or complete cure of the hypertension."(34) Gross believes that the best repair can be obtained with mattress sutures of silk. According to Hallenbeck and his associates, after resection for coarctation of the aorta in a group of 31 patients, approximately 50 per cent were clinically cured and more than 90 per cent were either clinically cured or benefited. "Because of occasional apparently good clinical results associated with poor laboratory results, clinical data alone cannot always be relied on to establish the anatomic adequacy of the anastomosis."

Potts describes a technique for resection of an aortic coarctation by means of a new clamp with many fine teeth. It is still debatable whether the suture technique should consist of an everting intima-to-intima mattress suture or a simple continuous end-to-end suture. From the experimental work with Smith, Riker, and Johnson (59), it appears that an end-to-end suture may be preferable. These workers have discovered less tendency toward immediate leakage from the suture line following end-to-end suture; there is also less constriction of the tissues and less encroachment upon the lumen by a continuous suture than by an everting suture.

In an experimental evaluation of different methods of suturing the thoracic aorta, Sako and his associates noted that the severed thoracic aorta of dogs united with No. 000000 braided silk in an end-on whipping stitch or an everting mattress suture has tensile strength in excess of the animal's physiological needs. There appears to be an equal incidence of thrombus formation with both methods. Intraluminal silk seems to play but a small role in thrombus formation; there was no instance in which the anastomosis became narrower than at the time of surgery. In anastomoses performed upon puppies, it was noted that

growth at the suture line does not keep abreast of the growth of the adjacent aorta.

An aortic resection and immediate anastomosis was performed by Brooks in puppies, and subsequent studies during life and after sacrifice revealed that the point of anastomosis will increase in size as the animal grows, but not as much as normal portions of the aorta. The degree of constriction ranged from 17 to 20 per cent at the site of anastomosis. However, this narrowing was not sufficient to stimulate the development of collateral channels or to cause cardiac enlargement. Johnson and Kirby report operations performed upon 7 pigs in which an end-to-end anastomosis of the abdominal aorta was done by different suture methods in order to observe the effect upon the growing aorta. When catgut sutures or interrupted silk was used the result appeared perfect. The site of anastomosis was difficult to detect and obviously had grown as the aorta increased in size. When a continuous silk everting mattress suture was used, there was constriction at the anastomosis with dilatation beyond it.

Sealy and McSwain describe an experimental method for producing coarctation of the thoracic aorta in dogs. Lucite tubing is used to replace a segment of the aorta and produce the desired degree of narrowing. Arterial hypertension has been produced in this manner, and it simulates that seen in coarctation of the aorta in man. The significant observation was that this type of experimental hypertension is progressive, requiring about 14 days to reach hypertensive levels. A method for producing a high degree of coarctation of the aorta in young dogs is also presented (22). The factors concerned in this method are: (1) the immediate reduction of the cross-sectional area of the thoracic aorta by "notching" the vessel; (2) the progressive constrictive fibroplasia induced by encircling the remaining vessel with a fibrogenic plastic band; and (3) the subsequent disproportionate growth rate between the narrowed area and the adjacent vessel. Coarctation of the aorta thus produced is stated to be physiologically, roentgenologically, and pathologically indistinguishable from similar lesions in man.

A method for producing gradual occlusion of large arteries, using a tantalum band and polythene, is described (23). A partial occlusion is immediately produced by the metallic band, and the fibrosis stimulated by the polythene produces a gradual constriction of the artery. This fibrous tissue acts to prevent erosion of the wall of the artery or aneurysm formation.

D. Pulmonic and aortic valvular stenosis. The problem of congenital pulmonary stenosis is different from that posed by the tetralogy of Fallot. In the former condition the stenosis involves the valves of the pulmonary artery, whereas in the latter anomaly the stenosis is more proximal and most frequently involves the infundibular and adjacent right ventricular regions. Brock presents a preliminary account of a new operation which has so far proved successful in 5 cases. The valve is divided by passing a special valvulotome through the wall of the right ventricle and up into the pulmonary artery. Hemorrhage from the heart is controlled by 2 rows of interlocking mattress sutures. Division of the stenotic pulmonary valve was accomplished in 19 patients by Blalock and Kieffer. There were 2 deaths, but the remaining patients were definitely benefited.

Donovan has experimented with homologous vein grafts in an attempt to circumvent the pulmonic valves. These grafts are stored for several days and then used to by-pass the valves in dogs. The distal end of the jugular or femoral vein is cuffed over a polyethylene tube and inserted into the right ventricle after the opposite end is anastomosed end-to-side to the left pulmonary artery. The proximal portion of the left pulmonary artery is then ligated. All of the 11 grafts which were examined later than 1 month after operation were occluded. These grafts can remain patent for several weeks, during which time the vein wall undergoes thickening and the valves function in a manner similar to that of the normal pulmonary artery.

A satisfactory technique has been devised for producing pulmonary stenosis experimentally in dogs (41). A small segment of the vessel is excised and the adjacent edges are sutured together so as to produce a stenotic area.

Although the treatment of pulmonic valvular stenosis has received considerable attention, the surgical therapy of aortic stenosis has thus far been relatively neglected. Experimental work has been performed by Bailey and his associates in an effort to devise an effective treatment for this lesion. Direct valve grafts and vein-valve grafts have been unsuccessful. Attempts have been made to by-pass the stenotic area by means of a graft anastomosed to the aorta and left ventricular chamber. "It is felt that the wide division of an aortic valve by either punch excision or simple incision produces regurgitation of greater magnitude than can be tolerated by diseased human hearts." In 1 patient an attempt was made to divide a fused aortic valve, as in the Brock procedure for pulmonary stenosis, but unexpected regurgitation developed and caused a fatal termination. "Since the pathology of aortic stenosis lends itself more favorably to mechanical dilatation

than does mitral stenosis, a method of dilatation has been developed." By means of a cervical approach, 2 patients with aortic stenosis were subjected to mechanical dilatation of the valve, with early clinical benefit to both.

In an effort to replace a diseased valve, Campbell created artificial aortic valves made of methyl methacrylate and placed them within the aorta distal to lacerated aortic leaflets. He observed function of these valves with satisfactory correction of the aortic regurgitation. These valves functioned up to 7 days in experimental animals.

E. Mediastinal venous obstruction. Gerbode, Yee, and Rundle relieved venous obstruction due to occlusion of the vena cava superior at different levels in dogs by anastomosing the azygos vein to the superior vena cava, the azygos vein to the atrium, or the superior vena cava to the atrium. Shunts from the azygos vein to the atrium were frequently unsatisfactory because of fibrosis at the suture line, but anastomosis between the superior vena cava and the auricle was technically feasible, and it remained patent and functional in most cases. In a later report, these atriovenous shunts produced definite alterations in the oxygen saturation of arterial blood, and it is postulated they might be utilized to correct certain congenital anomalies of venous return to the heart.

3. THE SURGERY OF PORTAL HYPERTENSION

There have been many operations proposed during the past few years for the treatment of esophageal varices and ascites due to portal hypertension. The portacaval shunt has been the most widely accepted and, if a satisfactory anastomosis is performed, prompt relief from esophageal bleeding and ascites can be anticipated. The preoperative evaluation of liver function is extremely important. According to Blakemore, patients with cirrhosis of the liver who have serum albumin levels of less than 3 per cent or with bromsulfalein retention in excess of 35 per cent are poor operative risks. "Careful study of individual cases, however, will reveal even in this group a wide margin of risk. Particularly is this true in post-hepatitis cases." Rousselot believes that splenectomy should always be the basic part of every operation for portal hypertension because the spleen exercises an inhibitory effect on blood formation in cases of congestive splenomegaly. A surgeon should not attempt splenectomy in a case of portal hypertension without being prepared to do a portacaval shunt. The splenic vein is often the only large portal tributary which can be utilized for a shunt and it usually undergoes thrombosis following splenectomy.

Linton and Hardy report encouraging results in that only 1 of the 19 patients in whom a splenorenal anastomosis was performed has bled since operation. They suggest a two-stage operation for poor risk patients. The first stage consists of interruption of the splenic artery and then, after the patient's condition improves, a splenectomy and portacaval shunt are performed. Several authors have advocated the splenorenal rather than the portacaval anastomosis, but the following facts stressed by Blakemore should be kept in mind. The portal vein usually has a thicker wall and is supported by the hepatoduodenal ligament. Atherosclerotic changes are more frequently found in the splenic vein, and there is also a greater chance of twist occurring in the anastomosis of this vein. Furthermore, the splenic vein has more branches in the operative area, and it is smaller in diameter than the portal vein. Many suture ligatures are usually necessary in the pancreatic area in dissecting out the splenic vein, and the resultant inflammatory reaction and secondary fibrosis may have ill effects on the anastomosis.

Julian and Metcalf report a case in which a side-to-side anastomosis of the portal vein to the vena cava was performed; they used a clamp similar to that devised by Potts, so that flow through both veins was possible during the anastomosis. One disadvantage was that an everting mattress suture could not be used. Furthermore, it is often difficult to approximate the 2 vessels adequately for such an anastomosis. In most of the successful shunts, an end-to-side anastomosis of the portal vein to the vena cava has been performed when the approach was on the right side. Vitallium tubes have generally been abandoned in operations of this type.

Gray and Whitesell describe a plan for surgical attack upon bleeding esophageal varices, utilizing the combined procedure of splenectomy, devascularization of the lower part of the esophagus and cardia, bilateral vagotomy, and gastroenterostomy. Three cases are reported in which this procedure was performed with excellent early results. Crile performed a transesophageal ligation and obliteration of the bleeding esophageal varices in 7 cases, and there were only 2 recurrences of bleeding from 7 months to 2 years after the operation. Splenectomy had been previously performed in all of these patients. However, in evaluating all of these new operations it is important to recognize the fact that spontaneous temporary cessation of bleeding from esophageal varices often occurs, and that no new procedure should be accepted until after long follow-up periods have elapsed.

4. BLOOD VESSEL GRAFTS

The employment of banks to store bone and other tissues has become increasingly widespread during the past few years in order that grafts might be available for any emergency. Gross, Bill, and Peirce have developed useful methods for the preservation of arterial grafts. Arteries can be stored in a special mixture of 10 per cent homologous serum in a balanced salt solution, to which are added a buffer, a *p*H color indicator, streptomycin, and penicillin. These vessels can remain viable, by tissue culture methods, for as long as 30 to 40 days. The arteries were removed from animals within 6 hours after death and were preserved for as long as 42 days before successful transplantation. On the basis of these experiments, similar arterial grafts have been employed in 15 patients, with encouraging results. Peirce has demonstrated that it is possible to use formalinized grafts in a similar fashion, but he states that when employed as grafts, formalinized vessels do not stand up as well as fresh ones. Homografts of the dog aorta preserved in pure alcohol at room temperature have been employed by Paolucci and Tosatti. Satisfactory results are reported, but the series was small and the grafts were stored no longer than 15 days.

Swan, Robertson, and Johnson have successfully utilized canine aortic homografts which were stored in Ringer's solution containing 10 per cent homogenous serum in an ordinary electric refrigerator at from 3 to 8 degrees centigrade. "For consistent successful transplantation of aortic homografts, the proper matching in size of the donor and recipient vessels is a factor of paramount importance. The duration of storage (up to 6 months) does not appear to be a significant factor governing the immediate functional success of the transplant." However, microscopic studies performed indicate that degenerative changes appear earlier and are more extensive in the grafts preserved longer than 40 days. The adventitia and intima of the graft seem to be totally replaced by similar layers formed from the host, although a portion of the media apparently survives. The elastic tissue survived for periods of as long as 10 months; the smooth muscle cells persisted only in the grafts stored less than 40 days.

Macpherson, Nabatoff, Deterling, and Blakemore have experimented with preserved vein grafts, and have successfully bridged arterial defects. Segments of inferior vena cava, from 2 to 6 cm. in length, were resected and preserved in a special saline solution. The veins were viable, by tissue culture criteria, for as long as 6 weeks after removal from the donor dog. Postmortem observations revealed that the most satisfactory immediate results were obtained when the graft and host vessels were of approximately equal size. The veins were seen to undergo gradual, marked fibrous tissue thickening of their walls, assuming the gross characteristics of arteries. The grafts functioned well, and there was no instance of aneurysm formation.

Fresh vein grafts have been used by Johnson, who performed similar experiments. Some dilatation of the grafts occurred, but there was no evidence of aneurysm formation. The grafts functioned well in all instances, and no alterations in circulatory dynamics were demonstrable in the femoral artery pulse pressure tracings after 14 months. Superficial femoral vein grafts were employed in 2 patients with the tetralogy of Fallot to bridge a defect between the subclavian artery and the pulmonary artery, with a satisfactory result in 1 patient.

Touroff and Nabatoff resected inferior vena cava segments, from 8 to 13 cm. in length, and then used these fresh grafts successfully in replacing the abdominal aorta in dogs. The animals have remained well and the femoral pulses palpable for periods as long as 14 months. It remains to be seen whether any marked degenerative process involves such large vein grafts. Postmortem studies will be performed after long periods have elapsed in order to determine whether the graft remains satisfactory, both anatomically and functionally.

It is apparent that fresh and preserved veins and arteries can be used as grafts. The problem remains as to whether veins are just as satisfactory as arteries in bridging blood vessel defects. If it can be demonstrated after long term observations that both types of graft undergo degeneration, that the host replaces practically the entire graft, and that the vein ultimately assumes the same characteristics as the arterial graft, then arterial grafts and arterial banks may become unnecessary. Certainly it is a simple matter to secure a vein graft in any patient when the need for it arises.

All of the preceding experimental work gives ample evidence of the great strides being made in the field of cardiovascular surgery. The ultimate goal is to perform definitive plastic procedures upon defective hearts and blood vessels in a bloodless field. This time is probably not far off because an effective apparatus for this type of surgery has already been successfully used in animals. When it can be applied clinically, it will then be possible to truly rehabilitate a patient, anatomically and functionally.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Osteosarcoma of the Mandible: Difficulties of Radiographic and Histologic Diagnosis (Ostéosarcome du maxillaire inférieur: difficulté du diagnostic radiographique et du diagnostic histologique). M. DECHAUME and F. BACLESSE. *Presse méd.*, 1951, 59: 387.

The authors report a case of fibrosarcoma of the mandible in a woman 55 years of age. Although repeated biopsies and roentgenologic examinations were done, the malignant character of the tumor was diagnosed only at the fourth biopsy, more than 4 years after the onset. In spite of rapid growth of the tumor, radiation treatment was started only after the histologic examination had confirmed the diagnosis of malignancy. The patient succumbed of general cachexia 6 years after the onset and 2 years after radiotherapy.

The authors discuss the radiologic and histologic findings and try to explain why the correct diagnosis was missed for several years.

WERNER M. SOLMITZ, M.D.

EYE

David's Authorship of the So-Called Sie-Boen-Lian Operation for Entropion, and Suggested Improvements. E. RAUBITSCHEK. *Brit. J. Ophth.*, 1950, 34: 727.

The operation for entropion originated by David in 1923, and described later by Sie-Boen-Lian in 1931, has been improved by the author and extended to the lower lid with equally good results.

Procaine, 4 per cent, with adrenalin is injected in front of the tarsus and, with the aid of an everter, a retrotarsal injection is made subconjunctivally. With the everter in position an incision is made parallel to the lid border, at a distance equal to the intermarginal surface, through the whole thickness of the tarsus along the entire length of the lid. The distal strip of tarsus is seized with forceps and its connection with the orbicularis is separated by scratching with the scalpel point until the roots of the cilia are exposed.

A black double-armed No. 1 suture is introduced 4 mm. apart through the conjunctival surface of the proximal portion of the tarsus at the center, and emerges out of the sectioned surface. Two white double-armed No. 1 sutures are placed similarly at the nasal and temporal thirds of the tarsus. The six needles are next inserted into the distal portion of the tarsus, entering through its original anterior surface and out through the conjunctival surface. The sutures are not tied but simply drawn tight, and the free ends shortened to 5 cm. length. The friction in the stitch canals provides sufficient security. The effect is to rotate the distal part of the tarsus 90 degrees forward. Its original anterior surface heals with the sectioned area of the proximal part; the conjunctival surface becomes the marginal surface, and the marginal surface assumes the plane of the outer lid surface.

Gauze patches over the eyes are fixed by a long narrow strip of adhesive tape stretching from temple to temple. The lower halves of the gauze are folded upwards so that only the upper lids remain covered. The free ends of the sutures are turned up over the patches, and a tight gauze roll, 0.5 cm. by 1.0 cm. in diameter, is placed over the incision. The slight pressure of a bandage over the upper lids further everts the lid border. After 5 days the sutures are removed.

The author claims that David's operation effectively provides a natural appearance, efficiency, and permanence. The details are clarified by several diagrams.

JAMES E. LEBENSOHN, M.D.

Physiological Considerations of ACTH and Cortisone Therapy with Reference to Opthalmology. S. HOWARD ARMSTRONG, JR., and EDWIN N. IRONS. *Arch. Ophth.*, Chic., 1951, 45: 251.

Cortisone of exogenous or endogenous (ACTH stimulated) origin has several important actions on inflammatory phenomena. Serial biopsy in inflammation demonstrates decreased cellular exudation with respect to neutrophilic polymorphonuclear leucocytes, round cells, and eosinophils. The permeability of capillaries to proteins in areas of inflammation is reduced and the development of a fibrotic reaction in healing is minimized. These results are largely beneficial, but may be deleterious to the healing of surgical wounds.

Ocular inflammations, whether due to direct bacterial invasion, to foreign protein hypersensitivity, or to chemical irritants, have proved unusually sensitive to blocking by cortisone. The inflammation, however, will recur when the effect of cortisone has worn off if the cause is not eradicated. If the inflammation constitutes a defensive reaction against infection, the administration of cortisone may mask the clinical signs of acute inflammation. ACTH and cortisone are not antibiotics, and their use does not supplant the proper chemotherapeutic or surgical treatment of infection.

The eye is readily available and responsive to local cortisone therapy which avoids the metabolic, and other, complications of systemic administration. In cases in which systemic therapy is required, few

complications are encountered if therapy is limited to 10 days. If therapy beyond this period is indicated, a diet low in sodium, with the addition of 3 gm. of potassium chloride or potassium bicarbonate by mouth, will prevent excessive fluid retention and hypopotassemia. Water retention may be kept track of by weighing; a gain of weight of 3 pounds or more in the first week of therapy demands investigation. FRANK W. NEWELL, M. D.

Use of Adrenocorticotropic Hormone and Cortisone in Ocular Disease. J. A. OLSON, E. H. STEFFENSEN, R. W. SMITH, R. R. MARGULIS, and E. L. WHITNEY. *Arch. Ophth.*, Chic., 1951, 45: 274.

Thirty-seven patients with inflammatory, degenerative, hereditary, and other diseases of the eye were treated with ACTH; 14 others were treated with cortisone. All but 1 patient receiving ACTH showed a striking reduction in circulating eosinophils. Cortisone also caused an eosinopenia, but the diminution did not occur as regularly as with ACTH. Twenty-two of the patients receiving ACTH showed a reduction in carbohydrate tolerance, but only 1 of the cortisone-treated patients showed a carbohydrate anomaly.

Twenty-six patients with inflammatory disease of the eye were treated and in all but 1 patient the eyes cleared successfully. The inflammatory lesions treated were: acute iridocyclitis (13); acute choroiditis (5); retinitis centralis (3); acute optic neuritis (3); and acute diffuse uveitis (2). Patients with chronic inflammations did not respond to therapy as rapidly or as successfully as those having acute conditions. Four patients with degenerative disease were treated without benefit. In 1 of 2 patients with retinitis pigmentosa, visual fields and dark adaptation unquestionably improved with cortisone therapy. Several patients with conditions usually resistant to current methods of therapy responded to ACTH or cortisone: acne rosacea keratitis, herpes zoster ophthalmicus, vitreous abscess (ACTH combined with antibiotics), granulomatous scleritis, postoperative keratitis, and vernal catarrh. Two patients with glaucoma and 1 patient with optic atrophy derived no benefit from the agents.

Cortisone and ACTH did not differ in the therapeutic results obtained. There are suggestive but not definite findings that the rate of relapse may be higher following treatment with cortisone than that after treatment with ACTH.

FRANK W. NEWELL, M. D.

Practical Considerations Concerning the Choice of Operation in Convergent Squint. PAUL A. CHANDLER. *Am. J. Ophth,*. 1951, 34: 375.

Practical considerations in the choice of operation for convergent strabismus are discussed. The author points out that the following factors must be considered in the analysis and classification of alternating convergent strabismus: (1) the presence or absence of an associated accommodative element; (2) the near point of convergence; (3) whether the amount of strabismus is greater when the patient is fixing with one eye than with the other; (4) the presence or absence of limitation of abduction and comparative abduction power of the two lateral rectus muscles; (5) the angle of convergence for distance and for near; (6) the presence or absence of an associated vertical component; (7) changes of fixation in various positions of gaze.

Cases of alternating convergent squint are divided into four general groups, viz.:

1. Those in which there is an apparent overaction of the medial recti. The operations recommended for this type of case are: recession of both medial recti; recession of one medial rectus; recession of one medial rectus and resection of the lateral rectus of the other eye; and correction of the vertical component only.

2. Those in which there is an apparent underaction of the lateral recti with little or no secondary contracture of the medial recti. The operation recommended for this type of case is resection of both lateral recti.

3. Those in which there is an apparent underaction of the lateral recti with contracture of the medial recti. For this type of case, recession of both medial recti is recommended.

4. Those in which there is an apparent overaction of the medial recti combined with underaction of the lateral recti. The operation suggested for cases in this group is resection of the lateral rectus with recession of the medial rectus of the same eye, resection of both lateral rectus muscles, recession of the stronger medial rectus of one eye, resection of the lateral rectus of the other eye, and bimedial recession. JOSHUA ZUCKERMAN, M. D.

Our Experience in 41 Corneal Transplants (Nuestra experiencia sobre 41 casos de injertos de cornea). RAÚL RODRÍGUEZ BARRIOS and JUAN VICENTE ECHAGÜE. *Bol. Soc. cir. Uruguay*, 1950, 21: 290.

These 41 transplantations of the cornea were done on 35 patients; in 2 of these patients the operation was performed twice on the same eye, and in 4 patients both eyes were operated upon.

The technique used has been quite similar to that commonly employed; the authors prefer the Franceschetti trepan and the preliminary suture method of Tudor Thomas. A series of excellent sketches, in the original text, illustrate the details of the technique used, both for the perforating and the lamellar methods.

Many of the postoperative complications and failures described in the literature have not been observed in this material. Among the 31 patients undergoing the perforating type of keratoplasty there was one instance of panophthalmia; especially fatal, in this instance, was the allergic response to novocain. In one case the transplant ulcerated and the addition of a lamellar implant to the transplant was debated; however, the ulcer healed without seriously affecting the vision subsequently attained. A loosened transplant was sewn back and healed perfectly.

In a few instances of early removal of the stitches (on the seventh postoperative day) a fistula developed with loss of aqueous humor, and miosis; this is a harmless complication which corrects itself under bandaging and atropin. It is usually the result of nonco-operation on the part of the patient, and is the reason for excluding from the operation the very young and the very old, and (at times) for anesthetizing very nervous patients for removal of the stitches.

There were 3 instances of synechia of the iris; in 1 case Castroviejo's cyclodialysis with subsequent injection of air in the anterior chamber gave favorable results; the remaining 2 cases were listed as failures.

The authors report a complication which they observed in 3 instances and which they have not seen described in the literature; this is a filamentous keratitis, which disappeared in each instance after treatment with a salve containing cocaine. Protrusions, partial or total, of the edge of the implant are not regarded as a true complication and disappear at the end of 10 or 15 days under pressure dressings. Ocular hypertension is always a grave complication; it may develop with synechias or without them; all but 1 case in this series responded to miotics, and the condition in this patient finally was conquered by cyclodiathermic treatment.

The chief late complication in this series was the much-feared "maladie du greffon" (10 cases). For this condition, apparently not much can be done; however, not all cases are by any means hopeless; sometimes the graft ultimately clears surprisingly. The chief resource against this complication is to guard against operating on highly vascularized fields —at least until the vascularization is reduced—and in certain cutaneous diseases, such as pemphigus.

In the 10 instances of lamellar keratoplasty of the French school, the authors experienced only one complicating intervention. This consisted essentially of a reactivation of an acne rosacea.

In judging of the success of the procedure the purposes for which the operations were done are considered (visual, therapeutic, cosmetic). The perforating graftings were successful in 100 per cent of cases in keratoconus, herpetic keratitis, and bacillary keratitis; 50 per cent of success was registered in syphilitic keratitis and 40 per cent in leucomas of unknown origin. There were only failures in the chemical cauterizations, dystrophy of the cornea and in pemphigus.

The lamellar graftings were successful in 100 per cent of cases in herpetic keratitis, dystrophy, and postpterygium leucoma; there was 100 per cent of failures in acne rosacea and in the chemical burns.

In the discussion, Stajano and Ordao expressed dissatisfaction at the laws of Uruguay, in that cadavers claimed by relatives may not be autopsied and those without relatives may not be autopsied within 24 hours of death. This in their opinion slows up the procuring of donor eyes to the point where the eye of the dead person is preserved at the expense of that of the living. Barrios replied that the purpose of this report was partly to arouse in the medical profession an enthusiasm for the correction of such conditions. The authors like to get their donor eyes within 6 hours of death and like to implant the corneal graft thus procured within 24 hours of obtaining it.

JOHN W. BRENNAN, M.D.

Glioma Retina. A Statistical Survey of New Cases at the Royal London Ophthalmic Hospital (Moorfields Eye Hospital). NARENDRA SINGH JAIN. *Brit. J. Ophth.*, 1950, 34: 709.

Cases of glioma retinae observed at Moorfields Eye Hospital have been reported periodically. Only 3 of the 286 cases accumulated since 1871 gave a familial history. The maximum incidence was in the first year of life, the next greatest incidence was in the second year, and age 7 was the upper limit for occurrence.

The present report covers 104 eyes in the period from 1925 to 1947 inclusive. In this group the percentage distribution was: retinoblastoma, 35; neuroepithelioma, 16; mixed, 36; undetermined, 13. Invasion of the optic nerve occurred in 31.5 per cent, and of the choroid, in 11.7 per cent. The vitreous was almost constantly fluid, degenerated, and contained clumps of glioma cells. Seedlings of glioma cells were found in the anterior segment in 16.9 per cent of the patients.

Enucleation gave the best chance for permanent recovery. The results of radiation were not too encouraging; the best effect occurred with radium (about 36 per cent cure), and deep x-ray failed completely. All 9 patients with choroidal infiltration had enucleation only; none developed recurrence.

The advisability of a combined intracranial and orbital operation cannot be established previous to enucleation and examination of the nerve stump. In only 3 of the 24 cases in which the optic nerve was invaded did microscopic examination indicate extension beyond the point of section. Recurrence in the orbit occurred only in these instances. A comparison with previous reports shows that early surgery and improved technique has improved the prognosis.

JAMES E. LEBENSOHN, M.D.

EAR

Lesions of the External Auditory Canal. WALTER P. WORK. *Ann. Otol. Rhinol.*, 1950, 59: 1062.

The various lesions of the external auditory canal are classified and discussed under three headings: those arising in the canal, those that involve the canal secondarily by extension, and those due to disturbances of development.

Benign lesions arising in the canal are not common. The most common malignancy of the external auditory canal is a squamous cell carcinoma, though still an uncommon type of body malignancy. It is characterized by slowness of evolution and a lack of early symptoms. Adenocarcinoma of the external auditory canal is extremely rare.

Hyperostoses, exostoses, and osteomas are examples of benign neoplasms of supporting tissue origin,

which occur in the external auditory canal. These frequently are asymptomatic and require no treatment. Fibromas, xanthomas, endotheliomas, lipomas, and chondromas are less frequently encountered examples under this heading.

Of the malignant lesions of supporting tissue origin, sarcoma is the most important example. Angiosarcomas, osteosarcomas, and fibrosarcomas are also encountered.

In the second group are found those lesions which secondarily involve the external canal. Included here are burns resulting from misuse of either roentgen therapy or radium emanations. The resulting ulcerations and necrosis in some of the cases were treated by wide excision of the necrotic bone.

Also included in the second group are cases of atresia of the external ear canal, due to otitis media, and such a case with its operative repair is reported. Mastoid disease can secondarily cause an osteitis of the ear canal. Less common is an erosion of the canal by a mastoid cholesteatoma. Occasionally, in this group are found neoplasms which reach the external canal either by direct extension from a nearby structure, such as the pinna, or by metastasis. Various types of war injuries can secondarily involve the ear canal, as can fractures encountered in civilian life.

The last group involved developmental defects of the external ear canal. These include atresia, tumors, and sebaceous cysts.

JOHN J. BALLENGER, M.D.

The Otological Concept of Bell's Palsy and Its Treatment. JOSEPH A. SULLIVAN and J. BRYDON SMITH. *Ann. Otol. Rhinol.*, 1950, 59: 1148.

It is the fundamental purpose of this presentation to clarify, if possible, the underlying etiologic factor for the production of the lesion causing Bell's palsy. Bell's palsy can be defined as an "edematous neuropathy of the distal segment of the facial nerve, a dysregulation of the circulation." The authors consider that an edema, from whatever cause, of the facial nerve as it passes through the dense bony canal comprising the lower portion of the fallopian aqueduct is the essential cause of the palsy. The swollen nerve tightly fills the bony canal and thus creates an ischemia of the nerve, with resulting pathological changes and dysfunction.

The cause of the edema is unknown, but an attempt was made to reproduce changes that appear related to this condition. The facial nerve of the rat was used and the normal distribution of the arterial and venous circulation was investigated by injection of latex into the heart, and by dissection.

Sections for microscopic study were made in paraffin with the use of hematoxylin and eosin, and osmic acid stain. Animals were killed at varying periods, from 4 hours to 4 months.

To create an edema of the nerve, either of two methods was used: (1) cold (e.g., an ice cube) was applied to the shaved face over the stylomastoid foramen, or (2) a suture was tied about the nerve.

By injecting trypan blue intravenously and intraperitoneally, the blood vascular system was given a blue color so that the results could be visualized. On the side where ice was placed there was a definitely "bluer tinge . . . suggesting an increase in tissue fluid." An increase in vascularization of the nerve occurred.

The application of ice to the face of other animals caused a temporary loss in conduction, in response to faradism, lasting a few minutes; also, a somewhat questionable collection of fluid was found to have displaced the funiculus away from the perineurium.

Tieing the suture about the facial nerve below the stylomastoid foramen caused an obvious paralysis within a matter of hours or days, depending on the tightness of the suture. The most interesting finding was the ever present gross edema above the suture extending to the stylomastoid foramen.

The authors believe that a case of Bell's palsy presenting facial paralysis, loss of faradic response, and accompanied by pain is indicative of a severe degenerative lesion and warrants surgical decompression of the nerve. JOHN J. BALLENGER, M.D.

The Surgery of Otosclerosis. TERENCE CAWTHORNE. *J. Lar. Otol.*, Lond., 1951, 65: 53.

The author presents a good review of the history of the principles and pathology underlying the progress in surgery for otosclerosis. A search through the current literature on this subject can be perplexing, and so many of the current articles are strong statements of faith in one or the other of a particular technique. This article clarifies the atmosphere considerably and is a brief but adequate treatise on what the technique of fenestration consists of, some of its pitfalls, and some of the postoperative complications. The results obtained by the author are given and are compared with those of others, whom he quotes.

It is believed that the operation of fenestration in otosclerosis should be for (1) alteration in the timbre of the voice, (2) intolerance of amplification, (3) appearance of paracusis, (4) reduction of bone conduction, and (5) pink-tinged tympanic membrane. He does not find much comfort in his results of revision operations and feels that they are generally disappointing. He has found that it may be better to make a fresh opening in the bony labyrinth, possibly in the posterior canal, rather than try to revise the original site of operation.

JOHN MARTIN, M. D.

A Study of Long Term Hearing Results in Fenestration Surgery. LOUIS E. ADIN, JR., and GEORGE E. SHAMBAUGH, JR. *Arch. Otolar.*, Chic., 1951, 53: 243.

The permanancy of the hearing result and the possible effect of the operation on the progressive nature of the disease are important considerations in fenestration surgery. To evaluate these points, a careful study was made of 390 patients who received fenestration surgery, and have been followed for 5 to 10 years.

In a review of these cases, the authors found that the long-term hearing results fell into four distinct groups. A group in which there was no significant gain in hearing at any time postoperatively, and a group in which there was a hearing gain after the operation, which was subsequently lost over a variable period to within 10 decibels of the preoperative level, composed only 5.6 per cent each, of the total group; 18.7 per cent showed a partial loss of the initial gain, and 70 per cent showed a good initial gain which was maintained for the duration of the case study.

The total number of patients under 20 and over 60 years of age receiving fenestrations is small. It seems significant, however, that only 50 per cent of the younger group maintained a satisfactory hearing gain, and 100 per cent of the older group received adequate hearing gains which were maintained.

The first group shows no appreciable gain in hearing, or an actual loss in hearing acuity postoperatively. A significant gain is considered to be 10 decibels or more in the average of the three speech frequencies. Twenty-two patients in this group were studied. In 54.5 per cent bleeding was mentioned in the operative note as being more bothersome than usual. Postoperative serous otitis is the principal cause of complete failure of the fenestration operation and excessive bleeding must bear direct relation to this.

In the second group, the improvement gained postoperatively was eventually lost. Until proved otherwise, at revision surgery, these patients were presumed to have a bony closure of the fenestra. Bony closure of the fenestra is becoming of less importance as newer techniques of surgery are being developed.

The third group showed a partial loss of hearing following a significant gain. None returned to the 10 decibel limit. Some had a loss of hearing for the lower frequencies, others for high tones, and still others for the middle tones or all tones.

Thirty of the 73 patients were considered to have a partial loss of the hearing they had gained, because of increased cochlear nerve degeneration, as evidenced by high tone loss at air conduction audiometry. Although bone conduction was not done it was presumed that a drop in the hearing acuity at 2,048 frequency range and above, without change in the low tones, was indicative of cochlear nerve degeneration.

Six patients lost part of the hearing gain because of a drop primarily in the low frequency ranges. This was considered to be due to a partial bony closure of the fenestra. All these cases occurred in the series following improved techniques, which means, possibly, that the bone is unable to provide enough osteogenesis to complete closure of the fenestra.

Thirty-seven patients with a partial loss of gain showed decreased acuity for all frequencies. This group showed a very slow progressive change over the years. No apparent cause could be found in 14 cases. In 11 patients there were definite fluctuations in hearing from time to time with associated inner ear disturbances such as vertigo, and fullness in the ear operated upon. This may be due to a hydropic phenomenon with intermittent depression of the cochlear end-organ. Treatment of this triad of symptoms with histamine has been tried with varying success.

Nine of the patients in the third group showed a loss in all frequencies, but which was more pronounced in the speech range. The preoperative audiograms of these cases showed a bone conduction deep in the same range. This suggests that such a speech frequency dip may be characteristic of certain otosclerotics.

The fourth group was composed of patients who received an initial significant gain and maintained that gain for 5 years or longer. In this group of 273 patients, only 7 received a gain which was less than 15 decibels.

Pregnancy and lactation are said to have a deleterious effect on hearing in otosclerotic women. In this series, 18 women became pregnant after the fenestration (three, twice); only one of the 18 gave objective evidence of increased hearing loss during or following pregnancy after the fenestration operation. Of the opposite ears in these 18 women, 6 were fenestrated within a 5 year period.

Two hundred and forty-one of the 390 patients had not received fenestration of the opposite ear in the 5 year study period. It was thus possible to study the effect of fenestration on the progressive nature of otosclerosis. In 21.5 per cent of the patients, cochlear nerve degeneration was found in one ear only. Progressive nerve degeneration occurred eight times more frequently in unoperated otosclerotic ears than in the fenestrated ears. This protection of the operated ear is significant despite the fact that the fenestration operation merely bypasses the pathologic centers of the bone.

JOHN R. LINDSAY, M. D.

MOUTH

The Pharyngeal Flap Operation as a Speech Aid. ROBERT E. MORAN. *Plastic & Reconstr. Surg.*, 1951, 7: 202.

The pharyngeal flap operation should be restricted to those palate cases in which initial operative correction has not given satisfactory speech. This usually is the result of a scarred atrophic palate with an associated incompetent palatopharyngeal sphincter. Thorough speech training should be tried before surgery. If adequate speech is not obtained, the operation should be done, followed again by thorough speech training.

The Dorrance "push back" operation, or other procedure, does not need to be combined with the pharyngeal flap operation. The flap insures adequate tension on the palate to give adequate sphincter closures. This is aided by hypertrophy of the constrictors through speech training.

The operative technique is as follows: local, or combined local and general, anesthesia is preferred. The soft palate is retracted to enable high infiltration of the pharyngeal wall. The procaine is injected between the pharyngeal wall and the prevertebral fascia to aid in dissection.

In the base down technique, a tongue-shaped flap is elevated, consisting of mucosa, pharyngeal fascia, and muscle with a wide base below. The width of the base must increase as the size of the flap increases. A 1 cm. to 1½ cm. area is denuded on the oral surface of the free end of the soft palate. The raw surface of the flap is sutured without tension to the raw surface of the palate. Longitudinal ties are wide to avoid interference with the blood supply.

In the base up (cranially) technique, a similar technique is followed, but the nasal surface of the palate is denuded for apposition with the flap.

Basing the flap above or cranially is indicated in the younger age group, especially in the presence of large amounts of adenoid tissue; also when the gap between the palate and the pharyngeal wall is great (over 2 cm.) In the remaining cases the flap can be based below.

For the first few postoperative days, there is considerable swelling of the nasopharyngeal area and spasm of the tongue. This quickly subsides, and in 5 to 6 weeks the patient is ready to resume speech training. Speech training in these cases is altered from the routine cleft palate case.

Complications are rare and usually occur in those cases in which the base down technique was employed. One patient complained of inability to breathe through the nose; another complained of persistent ear symptoms. When the pedicle has to be cut, the nasality of the speech usually returns.

Among 35 cases, 23 had marked improvement in their speech. Only 3 were failures. The 3 failures were directly related to faulty surgical technique. Speech recordings taken before and after surgery and at intervals during postoperative speech training serve as an indication of speech improvement.

JOHN R. LINDSAY, M.D.

Statistical Data and Therapeutic Indications with Reference to the Cervical Lymphatic Metastases in Tumors of the Lip (Dati statistici ed indicazioni terapeutiche nelle metastasi linfatiche del collo da tumore del labbro). G. F. GARDINI and G. FORNI. *Ann. ital. chir.*, 1950, 27: 835.

The material for this study comprises 399 tumors of the lip observed at the Radiologic Institute at Bologna, Italy, during the past 15 years. In 365 instances the tumor primarily involved the lower lip and in 34, the upper lip.

In 188 of the lower lip tumors there was no evidence of secondary involvement of the lymphatic system of the neck. In this group lymphatic involvement did not develop after healing of the primary lesion. There were 24 deaths in this group (87.2 per cent of the patients are still living). All of these deaths, however, occurred in cases of local recurrence; they were of unknown cause or due to intercurrent maladies. In 55 cases there was evidence of cervical adenopathy at the time that the primary lesion was treated; 48 (96 per cent) of the patients are still living and none died of metastasis. The enlarged glands either disappeared after healing of the primary lesion, or they remained unchanged.

Of the 72 patients with demonstrated malignant dissemination to the lymphoglandular system of the neck, 10 remained without treatment. The metastases were treated by some form of surgery in 47 and by irradiation therapy in 35. The figures, of course, imply that some of these patients received more than one modality. Of the 62 patients of this group, 57 could be traced later and 21 were reported as "dead of tumor"; however, the data received were not too precise. Of course, many of these patients had advanced conditions; indeed, some of them were absolutely inoperable. Of the remaining patients, 13 have remained well for 3 years or more. The greater part of these had been treated by surgery alone, or surgery followed by irradiation. Surgery has given the best results, and has been preferred for cervical lymph gland involvement in all except inoperable cases. This preference is, however, not to be construed as asserting the superiority of surgery in all cases of this character; in fact, of 3 patients (strongly suspected of malignant cervical dissemination) receiving exclusive irradiation therapy, all are living after a minimum of 3, and a maximum of 17, years.

Of the neoplasms involving the upper lip, the material is too small to permit of postulations. In 31 of the 34 patients, only the primary lesions received treatment. Of these 31 patients, 29 did not present any evidence of dissemination and the remaining 2 displayed a mild cervical adenopathy without malignant characteristics. These 2 were treated by irradiation and both are survivals. Of the 29 patients cited, 25 are survivals, 3 died of recurrence of the primitive lesion, and 1 died of an intercurrent malady. Of the remaining 3 patients with involvement of the upper lip, all received treatment for the cervical manifestations; 2 are survivals and 1 has disappeared. The authors' impression of these tumors of the upper lip is that they show a strong tendency toward local recurrence, but only a slight inclination to metastasize.

The authors' technique of extensive dissection of the lymph-bearing tissues of the neck was practiced in 21 instances. This consists at present of a transverse incision, from the midline beneath the mandible to a point behind the mastoid process, then turning downward behind the posterior border of the sternocleidomastoid muscle to the clavicle. This muscle, together with the external jugular vein and all the lymph-bearing tissues are removed en bloc. A series of photographic reproductions and schematic drawings in the original text render the technique employed evident.

Cervical dissection was carried out unilaterally in 15 of the 21 patients so operated upon, and bi-

laterally in 6. In 17 of these 21 instances malignant infiltration was proved, yet local recurrence developed in only 2 cases. The remaining 19 patients have remained clinically without symptoms; in 6 the clinical cure has persisted for 4 years, in 5 for 3 years, in 4 for 2 years, and in 4 for 1 year.

JOHN W. BRENNAN, M.D.

NECK

Malignancy in Adenomas of the Thyroid. FRANK H. LAHEY and HUGH F. HARE. *J. Am. M. Ass.*, 1951, 145: 689.

These authors discuss the early diagnosis and management of malignancy in adenomas of the thyroid gland. They stress the need for understanding and avoiding the present confusing ideas as regards this disease.

The necessity for differentiating between true tumors of the thyroid gland, the discrete adenomas, and the false tumors—the multiple adenomatous goiters—is emphasized. The incidence of malignancy in 1,971 consecutive discrete adenomas is shown to be 10.04 per cent while in 1,782 multiple adenomatous goiters, the incidence of malignancy is shown to be 0.62 per cent. The average time between onset and treatment varied between 0.66 and 10 years.

The distinguishing features of the discrete adenoma, in which the incidence of malignancy is so high, are: (1) its proneness to occur as a single tumor; (2) the possession of a definite true tumor capsule; (3) the fact that the thyroid tissue within this capsule exists in varying degrees of differentiation, from solid cell structures with almost complete lack of differentiation to full and complete differentiation. These differentiating points do not exist in multiple adenomas.

The authors believe that all discrete adenomas of any size, and in patients of any age, should be removed promptly after their diagnosis. The presence of malignancy in the adenoma cannot be determined preoperatively.

It is believed that the tumor should be removed intact and without rupture, and the authors believe this to be sufficient. They have, however, no disagreement with those who advocate complete lobectomy rather than removal of the tumor alone. Paraffin sections are awaited for the diagnosis of malignancy in the adenoma, and little reliance is placed on frozen sections.

Radical neck dissections are performed if malignancy has been found in discrete adenoma of the thyroid, even if they have not invaded the capsule, if they are of the grade II or grade III variety. They are also done in grade II and grade III adenomas if there is lymphatic or blood vessel invasion in the adenomas themselves. Such dissections are carried out in patients with discrete adenomas with papillary adenocarcinoma, without erosion of the capsule, but with invasion of the blood vessels or the lymphatics. Radical neck dissections are not done in patients who have discrete adenomas with papillary adenocarcinoma when there is no erosion of the capsule or no invasion of the blood vessels or of the lymphatics within the adenoma.

Radiation is used in grade I tumors when they extend into either surrounding tissue or lymph nodes. It is used also in grade II tumors and it is believed the quantity should be increased in alveolar adenocarcinomas. Radiation treatment is begun as soon as possible after operation, usually in 6 days. It is planned to cover the tumor bed and surrounding lymphatics; 4,800 roentgens are delivered in 28 days (170 roentgens daily) with half-value layer of 2 mm. of copper and avoidance of moist skin reaction.

Radioactive iodine is used (1) as a tracer to determine if any tumor remains; (2) as a curative agent in tumors that take up iodine in large enough quantities to destroy the tumor. Total thyroidectomy enhances the use of radioactive iodine in malignant thyroid tumors.

Further details are presented in the original article, and the authors stress the early removal of discrete adenomas as a prevention of malignancy in the thyroid gland.

DONALD C. GEIST, M. D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Symposium on Neurological Diagnosis by Roentgenographic Methods. (Neuroradiologicum Symposium; Rotterdam). B. G. Ziedses des Plantes, Th. Berkvens, J. W. D. Bull, C. Chaussé, and Others. *Acta radiol.* Stockh., 1950, 34: 247.

The October, 1950 number of the *Acta Radiologica* is, in itself, a monograph on neuroradiological diagnosis and methods and a symposium on neurological diagnosis by roentgenographic methods. The articles are in English or French and all have an English, French, and German summary. The quality of the printing and the illustrations is of the usual high standard which is found in this consistently good journal. There are 20 articles concerned with clinical presentations in this 171 page number. The articles are all short, very much to the point, and are written with a lean, almost sparing, use of words. They are delightful and profitable reading.

There are many new methods of diagnosis suggested, such as new tangents for study of the petrous bone, special techniques for intracranial pneumoencephalography, and improvements in the chemical nature of intra-arterial contrast dyes used in arteriography. There is also a thought-provoking discussion of positive contrast ventriculography with pantopaque. Some of the techniques would probably not be accepted by many American neurosurgeons and roentgenologists, but none would say that the new techniques are not brimming with imagination and promise. They are all provocative and they certainly signal an advance in some of our standard and somewhat moss-covered methods of mechanical diagnosis in neurologic problems. There is also a good discussion of the current problem of "discography" with the injection of the contrast medium directly into the nucleus pulposus.

This collection of concise articles is equally of as much benefit to the neurosurgeon as it is to the alert roentgenologist. John Martin, M.D.

The Possibility of the Use of Bone Paste in Plastic Repair of Cranial Defects (Possibilità di impiego della pasta ossea nelle plastiche della teca cranica). G. Enria and R. Ferrero. *Chir. org. movim.*, 1950, 34: 459.

The methods which have been proposed for repair of cranial defects are numerous. More recently there has been a trend to return to the prosthetic treatment with plates of such biologically inert metals as vitallium and tantalum. The results obtained from these methods have not been those hoped for. Such prosthetic treatment, undoubtedly, works against the laws of physiology and surgery.

The fibrous tissue that fills up the breach in a cranial defect does not ossify at the point of loss of substance because of the lack of attrition on the part of the bony residue. This is possibly why initially the pericranium and the connective tissue cicatrix which fills the bony defect inhibit the regenerative capacity of the bone. Numerous researches and various clinical characteristics have shown that the fibrous connective tissue is potentially capable of producing bone under favorable conditions. Bone grafts have been tried repeatedly, but have not proved entirely satisfactory.

Failure in the use of bone grafts and other methods of repairing cranial defects after craniotomy is thought to be due to inadequate vascularization of the grafted tissue. This inadequate vascularization of the inlaid tissue is due to the difficulty which osteoplastic elements have in penetrating the fibroangioblastic jellylike mass that fills up the cranial defect. To prove that vascularization of grafted tissue can be produced by the application of a bony paste at the site of the bony defect, the authors conducted a series of experiments on dogs.

In each experimental dog, a cranial defect was produced under anesthesia and under strict asepsis. After the removal of all bony detritus and hemostasis, the cranial defect was filled with a bony paste. The animals were divided into four groups.

In the first group, the bony defect was filled with a paste of powdered bone and blood, from the dog.

In the second group, the bony defect was filled with paste made up of the animal's bone and blood with 300,000 units of vitamin D_2 in an oily solution.

In the third group, a paste of bone and 300,000 units of vitamin D_2 alone was used.

In the fourth group, no paste was used at all to fill the bony defect.

Animals of each group were sacrificed at 20, 40, and 60 day intervals. At such times roentgenographic and histologic examinations were made and a detailed account of the findings were recorded.

From these experiments, it was found that the best results were obtained in the first group, in which the cranial defect was filled with a mixture of the animal's powdered bone and blood. Vitamin D_2 had shown no benefit roentgenologically or histologically in the cases in which it had been added.

Roentgenologically, the animals treated with bone paste and blood showed a regenerative process of bone of great activity. Within 20 days after treatment, the bone edges of the defect appeared irregularly notched and indistinct and were fused with newly formed bone of the bone paste inlay. In 1 animal, the bony defect was totally occupied by a bony opacity. X-rays at 40 and 60 day intervals showed that the bony defect produced by the craniotomy had been closed by a homogeneous bone tissue.

Histologically, 20 days after the experiment had been begun, the bone surrounding the cranial defect

showed the presence of newly formed bone. In the paste inlay there was active regeneration of bone as shown by centers of ossification in various stages of bony evolution. The tissue was abundantly vascularized and islets of uninterrupted trabeculation of young bone were seen establishing continuity with the old bone on the periphery of the cranial defect.

After 40 days, there was an abundance of bone regeneration which had almost filled up the cranial defect.

After 60 days there was complete closure of the bony defect by homogeneous, newly formed bone.

The process of regeneration was similar to that which takes place during the repair of fractures of the long bones.

Clinically, the authors recommend the use of paste made of powdered bone and blood of the individual patient in repair of bony defects of the cranial vault, nasal bones, and mandible.

They recommend it in the treatment of pseudarthrosis of the long bones.

In bone-grafting operations, it is useful for promoting a prompt and solid attachment of the graft.

In the treatment of osteomyelitis and in the removal of bone cysts, it is recommended for the repair of the cavities necessarily produced by the surgical intervention.

BLACKWELL MARKHAM, M.D.

The Normal Cerebral Angiogram. ROBERT W. CURRY and GEORGE G. CULBRETH. *Am. J. Roentg.*, 1951, 65: 345.

In view of the increasing employment of cerebral angiography, the present article is most timely and worth while. The normal variation must be well understood to correctly interpret the abnormal findings. The authors selected 50 patients, from a total of 210, whom they considered did not have any angiographic abnormalities. It was realized, of course, that a study upon completely normal individuals would have been preferable, but such could not be done with justification. In this series, the authors used 35 per cent diodrast by the percutaneous puncture of the common or internal carotid artery.

Roentgen anatomy, anatomical variation, and physiologic variations are discussed separately for each artery. The diameter of the internal carotid artery usually varied from 3 to 5 mm. An important, but rare, anomaly is the complete absence of the internal carotid artery. The course of the vessel may be quite variable. The greatest variation is in the infraclinoid portion. Arterial tortuosity is certainly more marked in the older age group but was also found in the younger patient. It is felt that "old age and accompanying arterial sclerotic changes only increase the degree of tortuosity which is already present." The actual degree of tortuosity could not be correlated with the number of curves in the supraclinoid portion of the internal carotid artery. The distal part of the carotid artery may parallel the proximal segment, be superimposed on it, or be separated from it by a distance up to 10 mm. The ophthalmic artery could be identified in 98 per cent of the cases.

Spasm with temporary complete occlusion of the internal carotid artery was noted in several cases. It is realized that several injections are necessary before one can be positive that spasm has occurred or whether there is an actual occlusion. It is not believed that the spasm is due primarily to the use of diodrast since others have reported this phenomenon with the use of thorotrast.

The anterior cerebral artery was always filled during some period of the angiographic study. It is pointed out, however, that in 4 per cent of the cases filling did not occur during one of the injections. This is probably due to vascular spasm. Filling of both anterior cerebral arteries occurred in 46 per cent of the cases. This was also a common finding in other cases reported in the literature. Complete absence of the anterior cerebral artery was extremely rare, although variations in the proximal portion of the artery were apparently common.

The anteroposterior projection is valuable as an indication of lateral shift of one of the cerebral hemispheres. It is pointed out, however, that although the artery is usually located within 4 mm. of the midline, there may be considerable tortuosity causing much greater displacement. In 88 per cent of the cases the anterior cerebral artery was found to be within 4 mm. of the midline, as previously mentioned; however, in the remaining 12 cases a greater shift occurred and in 2 of these the distance was 10 mm.

The middle cerebral artery apparently varied to a greater extent than the others. There was usually marked tortuosity in many of the branches of the middle cerebral artery with frequent crossing. This is most easily demonstrated in stereoscopic views. The artery always filled unless there was definite pathologic disturbance. In the anteroposterior projection the middle cerebral artery, shortly after arising from the internal carotid, is at the same level as the bifurcation or, at the most, a few millimeters below it. Any elevation or superior displacement is pathognomonic of a space-occupying mass in the temporal lobe.

The basilar artery, posterior cerebral artery, and the venous system are likewise discussed.

JACK I. WOOLF, M. D.

Diploic Angiomas of the Cranial Vault (Angiomes diploïques de la voûte du crâne). D. PETIT-DUTAILLIS and M. FELD. *Sem. hôp.*, Paris, 1951, 27: 197.

Angiomas of the cranial bones are rare, only 59 cases having been reported to date. Of these, only 39 were primary tumors of the skull. They occur three times as often in females as in males, the most common site being the parietal bone, and the age of predilection between 31 and 40 years of age. Multiple cranial angiomas have been reported in 7 cases. The patients complain of a palpable and often visible swelling of the skull of insidious growth, often slight-

ly painful, but negative to auscultation and covered by an intact scalp. The pathogenesis is obscure but a congenital origin is assumed. Nearly all cases have a history of a single chronic, slowly growing tumor, painless at first but growing increasingly painful in advanced stages. Also catamenial exacerbation of pain has been reported. The tumor is uniformly hard although pulsation and a depressible center have also been described.

Roentgen examination reveals a pathognomonic image of round or oval shape, occasionally with irregular margins. The bony plaque is divided by trabeculae which give it a honeycomb appearance. The neighboring diploic vessels are not dilated, and frequently there is only a single vessel of derivation. There is no hyperostosis of the surrounding bone and, viewed tangentially, it is observed that the angiomatous plaque erodes only the external table, the integrity of the internal table constituting one of the differential criteria. The striae are radial and quite different from the parallel striae observed in meningioma. Stereoradiography may help to demonstrate the relation of the tumor to the external and internal tables of the involved bone, while roentgenography permits differentiation from other bony tumors of this region, such as meningioma, chronic circumscribed osteomyelitis, circumscribed osteoporosis, cranial epidermoid (cholesteatoma), xanthomatosis of Schueller-Christian, osteoma, osteogenic sarcoma of the osteolytic type, etc.

It therefore becomes necessary to consider angioma in all cases of unexplained localized cranialgic headache. The strictly local character is significant. Even in the absence of any manifest tumor, palpation of the skull in the affected region will cause sharp pain similar to that of spontaneous origin. There are no focal neurologic symptoms. In angioma of the base (orbital or petromastoid) the cranial nerves may be affected in their passage through the bone. The clinical symptoms may simulate localized osteitis or, in particular, syphilitic osteitis.

Cranial roentgenograms should be taken systematically in the usual sagittal and lateral exposures. The Towne-Twining position is recommended for angioma in the temporo-occipital region, and the Stenvers and Schueller position for tumors in the occipital region. Contrast images are of little aid, but pneumoencephalography will demonstrate the presence of a diffuse subarachnoid dropsy. Arteriography of the external carotid yields little information. A simple x-ray film is pathognomonic and if confirmation is needed, bony biopsy is preferable.

Diploic angioma may consist of one or multiple foci and may involve one or more bones of the skull. The histologic types include (1) capillary angioma and (2) cavernous angioma, the latter being most common.

Other bones are rarely involved. The tumor is benign and there are no metastases. A rare special type is the hemangioendothelioma.

The suggested treatments include (1) surgical removal followed by cranioplasty in one stage, which is not too risky (the only logical method for treating exteriorized angioma), and (2) destruction by deep radiotherapy (McKenzie, 1939) or radium (Irgens, 1939). This nonsurgical treatment is reserved for angiomas of the base and has only a relative efficiency.

Two cases are described, in which the angiomas were in incipient stages and not exteriorized. The patients were not aware that they were suffering from tumors, but complained of severe headaches limited exclusively to a certain region of the skull, i.e., veritable cranialgias. In the absence of careful roentgen examination, the condition might easily have been taken for an inflammatory lesion of the skull. Physicians might easily be puzzled by these autonomous pain syndromes. In these 2 cases, fragmentary removal for biopsy afforded relief from pain, and the patients will be watched for further developments before any decision is made to remove the angiomatous bone. It must be kept in mind that the evolution of a diploic angioma is very slow, and that only the tumoral types are a menace to the integuments and dura mater.

EDITH SCHANCHE MOORE.

Cisternography and "False Cisternal Images" (Cisternografia e "false immagini" cisternali). M. QUARTI and F. MIGLIAVACCA. *Chirurgia*, Milano, 1950, 5: 241.

In cisternograms subdural diffusion of air is somewhat hard to identify, the extracisternal images resembling the cisternal ones so closely that the interpretation of the roentgen films is rather difficult.

Cisternal encephalography is used routinely in the clinic of the authors, and in a revision of more than 200 cisternograms, 60 in children under 2 years old and 150 in adults, the authors have come to the following conclusions:

1. Subdural air is found most often in hydrocephalic infants (20%). This may be due either to the difficulty of keeping the needle steady, or to the thinness of the cortical covering.

2. Air introduced through the lumbar or suboccipital route in the position of cisternography usually distributes itself toward the arachnoid space of the frontal convexity. However, if there should be a deviation of the gas toward the subdural space any one of the following effects may take place:

a. The gas may remain completely in the subdural space. This occurs when the needle enters the subdural instead of the subarachnoid space.

b. The gas may invade the subdural and subarachnoid spaces contemporaneously. This is the most frequent result and may be attributed to laceration of the arachnoid at the point of entrance of the needle.

c. The gas may remain at first in the subarachnoid space and then gradually invade the subdural space. This may happen if there is a dehiscence of the arachnoid at the base of the encephalon.

3. The roentgenograph of a pseudocistern shows a serpiginous shadow surrounding the base of the

cranium which proceeds toward the clivus and the quadrilateral lamina, and then crosses the sellar ostium; the shadow is much thicker beneath the frontal plate. In the adult, however, the subdural air goes beyond the sella only rarely and when it does it assumes the shape of the letter S. In children less than 2 years old, the resistance being much less, the air reaches the anterior fontanelle, where its presence can be confirmed by percussion. Rarely, the gas may deviate toward the sphenoidal wing or the fissure of Sylvius. With an anteroposterior view the gas can be easily located outside the arachnoidea.

The authors conclude:

1. In from 10 to 20 per cent of the cisternograms air is revealed in the subdural space.
2. Air injected through the lumbar or suboccipital route may enter the subdural space because of a spontaneous or artificial laceration of the arachnoidea.
3. Pseudocisternal shadows may be caused by extra-arachnoid air surrounding the cisterns.
4. Diffusion of air in the subdural space endangers the regular filling of the brain cavities and makes it difficult to interpret the roentgenograms.

JOSEPH M. A. PAPE, M.D.

Posttraumatic Brain Abscesses Without Symptoms (Symptomenarme posttraumatische Hirnabszesse). K. HUBER. *Wien. med. Wschr.*, 1951, 101: 126.

The author reports a series of 10 brain abscesses after war injuries. He discusses the difficulties of diagnosis in cases in which few or no symptoms, or signs, were present until some time had elapsed after the injury. The intervals between the injury and the development of the symptoms varied from 2 months to 1 year. The writer emphasizes the importance of close clinical observation and the limitations of such diagnostic methods as roentgenography, ophthalmoscopy, encephalography, and ventriculography. It is noteworthy that in all 10 cases these diagnostic methods failed, and only the clinical picture led to the correct diagnosis and extirpation.

Why do these methods which give valuable information in the diagnosis of tumors frequently fail in posttraumatic abscess? The author believes that the main reason is the fact that after shot injuries the skeleton of the skull is no longer intact and does not form a closed space. The characteristic roentgenologic picture of increased intracranial pressure does not develop as the pressure is transmitted through the defect in the skull. For the same reason choked disc does not usually appear in posttraumatic brain abscess. None of the author's 10 patients showed a choked disc at any time.

WERNER M. SOLMITZ, M.D.

Nerve Anastomosis in the Treatment of Facial Paralysis. Special Consideration of the Etiologic Role of Total Removal of Tumors of the Acoustic Nerve. J. GRAFTON LOVE and BLAND W. CANNON. *Arch. Surg.*, 1951, 62: 379.

The authors presented a survey of 87 cases of unilateral facial paralysis in which spinofacial nerve anastomosis was performed at the Mayo Clinic from January 1, 1926 to January 1, 1949, inclusive.

The causative factor for the facial paralysis in 41 cases was that of surgical treatment of cerebellopontine angle (acoustic) neurofibroma, the facial nerve having been injured or sacrificed by necessity in the removal of the tumor; surgical treatment of mastoid infection accounted for 25 cases; head injury with basal fracture for 7 cases; surgical interruption of the facial nerve in the treatment of facial tic was the cause of the paralysis in 3 cases; an unintentional sacrifice of the seventh nerve in dividing the intracranial portion of the eighth cranial nerve in the treatment of Ménière's disease accounted for 2 cases; an anomalous artery of the cerebellopontine angle, and a birth injury associated with forceps delivery each contributed 1 case; the cause was unknown in 7 cases, and in 1 of these 7 a pontine glioma developed which was verified 3 years later at the time of craniotomy; infection of the mastoid was the probable cause in 2 others.

In 61 of these 87 cases the patients were adequately followed. The analysis of results, presented in the complete article, is based on these 61 cases. The authors attempted to set forth the expected result of spinofacial nerve anastomosis in the treatment of facial paralysis. The results have reassured them that, whenever possible, the spinal accessory nerve should be employed to conduct impulses to the facial musculature in cases in which re-establishment of the continuity of the facial nerve is impossible. Although perfect function cannot be expected, particularly in regard to emotional responses, the nerve anastomosis does offer very satisfactory reinnervation in the majority of cases.

Evidence was obtained from this study to show that the duration of the facial palsy is not as important a consideration in the selection of candidates for spinofacial anastomosis as had been previously thought. Definite atrophy of the facial muscles, on the other hand, militates against a good functional recovery.

Consideration of the status of the fifth cranial nerve in cases in which a cerebellopontine angle tumor has been removed is quite important in predicting the expected result of spinofacial anastomosis.

When a patient with a benign tumor of the cerebellopontine angle, particularly with a neurofibroma of the eighth cranial nerve, presents himself for treatment, complete removal of the tumor is desirable even though it means sacrificing the seventh cranial nerve. The residual dysfunction of a spinofacial anastomosis is a small price to pay for cure of a brain tumor that otherwise might cause the death of the patient.

Undesirable symptoms involving the shoulder, as a result of utilizing the spinal accessory nerve, are almost never observed. It should go without saying that no good can be accomplished unless the spinal accessory nerve was intact and functioning normally prior to the anastomosis with the facial nerve.

The most successful surgical anastomosis will fail to give a good functional result unless the patient is intelligent, co-operative, and willing to practice conscientiously in striving to dissociate shoulder and facial movement.

SPINAL CORD AND ITS COVERINGS

Protrusion of Thoracic Intervertebral Discs with Compression of the Spinal Cord. RAGNAR MÜLLER. *Acta. med. scand.*, 1951, 139: 99.

The author presents a study of 4 cases of protrusions of thoracic intervertebral discs. It is recognized that the protrusions may occur laterally and hence produce nerve root irritation and radicular symptoms, or the protrusion may be midline and result in compression of the spinal cord. The radicular symptoms may oftentimes be completely misdiagnosed since the pain is easily misinterpreted as "intercostal neuralgia, angina pectoris, or some visceral affection of the abdomen." Unless the surgeon remembers the possibility of a thoracic disc causing such symptoms, the proper studies, such as myelography, may not be carried out. The midline disc, which may result in variable degrees of a transverse lesion of the cord, often produces a dissociated sensory disturbance suggesting the presence of an intramedullary lesion. At times a remittent course may suggest multiple sclerosis.

X-rays of the vertebral column may be indecisive. In 2 cases, calcification in the involved disc and narrowing of the interspace was seen; however, in the other 2 cases there were no findings of diagnostic significance. Myelography may reveal either a complete block as was found in 1 case, or an incomplete filling defect, as found in 3 cases.

The results of surgery in these cases were extremely poor. Following surgery there was an almost complete transverse myelitis in all cases, which was permanent. Since the protrusions in these cases were all of the hard, calcified type, it was necessary to chisel away the mass, requiring traction on the cord. It is suggested that in the future, surgery be limited to laminectomy and decompression unless the herniated disc is of recent occurrence, in which case the disc material may be removed without damage to the spinal cord. JACK I. WOOLF, M.D.

Protrusions of the Lumbar Intervertebral Discs; A Clinical Review Based on 500 Cases Treated by Excision of the Protrusion. JOHN E. A. O'CONNELL. *J. Bone. Surg.*, 1951, 33-B: 8.

The author presents a series of 500 cases of proved lumbar intervertebral disc protrusions in patients operated upon over a 10 year period at St. Bartholomew's Hospital, in London. It is pointed out, however, that this number is but a small proportion of patients seen with lesions of the intervertebral discs. The majority of patients are in the age group from 20 to 40, the youngest being 16 years of age and the oldest 58 years of age. The mechanism of pain caused by the disc protrusion is believed to be largely a combination of stretching and compressing of the nerve root in 60 per cent of the cases, and tension alone in 31 per cent of the cases.

A review of the etiologic factors revealed that a history of definite injury was obtained in 59 per cent of the cases, of pregnancy and labor in 5.8 per cent, physical weakness in 1.2 per cent, and no etiologic factors were discovered in 34 per cent.

Pain was the predominant symptom, and in the majority of cases (86.8%) it was present both in the lumbar spine and in the lower extremity; however, it was present only in the lower extremity in 13 per cent, and 1 patient had pain only in the low back. "A careful determination of the peripheral radiation of the pain is important in localizing the affected disc: involvement of the heel, sole, and outer margin of the foot points to a lumbosacral disc lesion; radiation to the dorsum of the foot and hallux suggests protrusion of the disc between the fourth and fifth lumbar vertebrae; anterior thigh pain radiating across the patella and along the anteromedial surface of the leg points to a lesion at the second to third or third to fourth lumbar interspace."

Twenty-one patients had severe weakness in one or both extremities and 5 had clinical pictures suggestive of severe involvement of the cauda equina. Clinical signs are divided into three categories of spinal, tension, and neurologic signs. Spinal signs consisted of reduced mobility, which was present in 100 per cent of the cases, deformity of the lumbar region, and tenderness. Tension signs consisted of positive straight leg raising tests in 99 per cent of the cases. The 5 patients in whom this was absent had a disc in the upper lumbar region. In all of these cases the femoral nerve stretch test was positive. Naffziger's sign was usually indicative of a laterally placed disc. The neurologic signs consisted of motor, sensory, and reflex disturbances. Although motor disturbances were frequently present they were of least value in localizing the lesion; sensory and reflex changes were of much greater importance in this respect.

As is well recognized, roentgenograms of the low back are taken for three purposes: (1) to rule out the possibility of some other responsible lesions, such as neoplasm; (2) to indicate the possible level of the lesion as evidenced by narrowing or sclerosis; and (3) to show any congenital variations. In the present series, 10 per cent of the cases had "occult sacralization." Although the author used myelography in earlier cases, he now believes that this should be done only in atypical cases and especially if the presence of a neoplasm is suspected.

The operative procedure is similar to that used by the majority of neurosurgeons in the United States. This consists in the unilateral subperiosteal exposure of the laminae and the performance of a partial hemilaminectomy, if necessary, to expose the disc. An attempt was usually made to remove as much as possible of the intervertebral disc tissue, although by weighing each specimen it was found

that very seldom was more than 20 per cent, by weight, of the average disc removed. In some cases of so-called "concealed disc" excellent results may be obtained if adhesions between the nerve root and posterior longitudinal ligament are divided. It is agreed, however, that the term "concealed disc" is not appropriate.

A careful evaluation of the postoperative status revealed that 46.5 per cent of the patients had no symptoms referable to the disc lesions, 77.6 per cent had no pain in the lower extremity, and 60 per cent had no low back pain. The remaining patients in each of these groups had a variable degree of pain, but in the great majority it was usually slight, or transient, and occurred especially on exertion.

JACK I. WOOLF, M.D.

Indications for, and Results of, Surgical Treatment of Prolapse of the Lumbar Intervertebral Discs (Indikation und Ergebnisse der operativen Behandlung des lumbalen Bandscheibenprolapses). H. KUHLENDAHL and V. HENSELL. *Deut. med. Wschr.*, 1951, 76: 165.

A large number of the cases of ischialgia and backache are caused by compression of the spinal nerves due to the protrusion of an intervertebral disc. The authors differentiate five stages of this disturbance. The first is simple degeneration with a tear in the annulus fibrosus, and the second is dorsolateral bulging, which is reversible. In the third stage, the "sequestrating prolapse," the most peripheral layers of the annulus are not yet torn but are stretched and still contain the bulging prolapse. In the fourth stage the disc is completely torn, usually at the dorsal aspect, and the prolapse is sequestrated. Finally, a lateral prolapse into the intervertebral foramen may occur.

A great number of these cases, except those in the fourth group, are reversible and can be treated conservatively. The aim of all conservative, as well as surgical, treatment is decompression of the spinal roots. The authors emphasize that no other treatment is as effective as prolonged bed rest. All other therapeutic procedures, such as physiotherapy, local injection of anesthetics, and drug therapy, have only auxiliary value. Many patients belonging to the first three groups recover under this treatment. However, recurrences are frequent, and only about one-third of the authors' patients who were treated conservatively could be considered as permanently cured.

The main purpose of the operation is to relieve the compression of the spinal nerve roots and the ensuing segmental irradiating pains. In addition, the mechanical disturbance at the intervertebral articulation is repaired by the removal of the dislocated tissue mass. It is obvious that the anatomical lesion as such cannot be cured by the operation or by any other therapy; only the prolapse and the compression can be treated. The indication for intervention depends on the degree and the intractability of the segmental pains. Backache alone should not be considered as an indication for surgery, although in the majority of cases it is also relieved by the operation.

The authors reviewed 21 articles of the international literature covering 6,600 operations, and found that the results were excellent or fair in an average of 90 per cent of the cases.

They were able to follow up 210 of their own operative cases for more than a year; 65 per cent of the patients were cured completely, 30 per cent showed marked improvement in their condition, and 5 per cent presented unsatisfactory results. Recurrences were observed in 12 patients; in 7 of these, cure of the condition was accomplished by a second intervention.

WERNER M. SOLMITZ, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Cancer of the Breast. Results of Treatment, 1929 to 1943. JORGEN SAUGMANN-JENSEN and PAUL JACOBY. *Acta radiol.*, Stockh., 1950, 34: 453.

Five hundred and forty-eight patients with cancer of the breast were treated during the period from 1929 to 1943 inclusive at the Radium Center in Odense, Denmark.

Two hundred and eighty-nine patients underwent a radical operation, 41 had a local operation, and 59 had recurrences when admitted. The percentage of operability was 75. Forty per cent of patients were alive 5 years after a radical operation. Preoperative and postoperative irradiation was employed in 159 cases, and postoperative roentgen treatment alone was done in 130 cases. Thirty-seven per cent and 42 per cent, respectively, were alive after 5 years. Local recurrences developed within 5 years in 11 percent of the first group and in 17 per cent of the second group. Sixty-six per cent of 41 patients were alive 5 years after local operation. After 5 years, 30 per cent of the entire series were alive and 20 per cent were free of recurrence, but after 10 years only 18 per cent had no recurrence.

The authors conclude, from their review, that no demonstrable effect of preoperative or postoperative roentgen treatment could be noticed in their material. Postoperative irradiation possibly reduces the number of local recurrences.

Forty-one patients were subjected to a local operation and were given preoperative and postoperative, or only postoperative roentgen treatment. Although this series is relatively small, the authors raise the question of whether a local excision supplemented by irradiation does not furnish as good results as a radical operation. JOSEPH K. NARAT, M.D.

TRACHEA, LUNGS, AND PLEURA

Congenital Bronchial Malformations (Malformations bronchiques congénitales). ANDRÉ DUPREZ. *Acta chir. belg.*, 1951, 50: 65.

The author records his experience in the care of 6 patients with congenital malformations of the bronchi. These lesions are usually asymptomatic and come to professional attention only by the discovery of abnormalities on routine roentgen films, and to surgery in order to exclude malignancy.

The malformations can be classed as various types of (1) inferior accessory lobes, or (2) abnormal bronchial bud remnants. Such lesions are often accompanied by vascular abnormalities which occasionally cause problems of hemostasis.

In one of the case histories, a large artery originating directly from the aorta traversed the left diaphragm to enter the diaphragmatic surface of the lower lobe of the left lung. ORVILLE F. GRIMES, M.D.

The Clinical Physiology of the Human Bronchi. The Effect of Vagus Section on the Cough Reflex, Bronchial Caliber, and Clearance of Secretions. KARL P. KLASSEN, DOUGLAS R. MORTON, and GEORGE M. CURTIS. *Surgery*, 1951, 29: 483.

Results obtained from various surgical procedures to the extrinsic pulmonary nerves, and conclusions as to the neurophysiology of the human bronchi are debatable. Unilateral vagus section on 7 patients with advanced inoperable bronchiogenic carcinoma afforded the authors the opportunity to study the effect on the bronchial caliber, the cough reflex, and the bronchial secretions. Patients in whom the extent of the malignant invasion of the mediastinum suggested involvement of the sympathetic nerves, or in whom the malignancy greatly distorted the main bronchial tree were excluded from the study.

Unilateral vagotomy was accomplished on these patients above the origin of the pulmonary plexus and below that of the recurrent laryngeal nerve. The following results were obtained:

1. The cough reflex arising from the homolateral bronchial tree was abolished in all patients. These findings appear to indicate that the afferent fibers transmitting bronchial impulses resulting in initiation of the cough reflex are carried by the homolateral vagus nerve.

2. Pain of bronchial origin was abolished in the homolateral side in all but 3 patients, in whom there was referral of pain to the contralateral anterior cervical region. These results suggest that the afferent fibers transmitting pain from the bronchial tree are carried by the homolateral vagus nerve. Certain of the afferent fibers from the bronchial tree are carried by the contralateral vagus nerve.

3. Bronchograms reveal no effect upon the normal respiratory movements of the bronchi. Paralytic dilation of the homolateral bronchi was not found. Complete emptying of the bronchial tree was noted in the majority of patients. Bronchospasm persisted even after bilateral vagotomy.

4. No gross changes were noted in the amount nor in the consistency of the bronchial secretion. No impairment of the tracheobronchial clearance of lipiodol was noted. HERBERT J. KAROL, M.D.

Bronchoscopic Findings in 150 Adults with Pulmonary Tuberculosis (Constatations bronchoscopiques chez 150 tuberculeux pulmonaires adultes). A. LÉVI-VALENSI, A. ZAFFRAN, and C. MOLINA. *Sem. hôp.*, Paris, 1951, 27: 171.

Bronchoscopic studies in 150 adult patients with tuberculosis of the lungs corroborated the diagnosis and established the relative frequency of perforation of glands into the bronchi. No aggravation of symptoms by this diagnostic procedure was ever encountered. In 5 cases transient dyspnea was successfully combated with antihistaminic drugs.

Bronchi were found to be normal in only 3 patients. Specific lesions were present in 67 patients. They were found in 47 per cent of men and 40 per cent of women. No relations could be established between the gravity of the pulmonary condition and the extent and location of the bronchial lesions. Nonspecific bronchitis was encountered twice as frequently as tuberculous lesions. Fifty per cent of specific lesions were formed by ulcerations, while in the remaining cases cicatricial stenosis, ulcerostenosing lesions, or fistulas were found. The latter were located most frequently in the right upper bronchus, the left main bronchus, and in the trachea; in other words in the region of adjoining tracheobronchial lymph glands. JOSEPH K. NARAT, M.D.

Importance of Extrapleural Pneumothorax in the Collapse Therapy of Pulmonary Tuberculosis. J. W. CUTLER. *J. Thorac. Surg.*, 1951, 21: 217.

The author reviews 129 extrapleural pneumothorax operations performed in a consecutive series of 121 private patients. These operations were done for pulmonary tuberculosis during the past 12 years, and 91 (70.6%) were considered successful; 21 (16.2%) were unsuccessful and there were 17 (13.2%) operative deaths. These procedures were carried out in poor risk patients at a time, in many of the cases, when antibiotics were not available. All operations were performed by the author. He classifies as successful those cases in which the diseased lung was satisfactorily collapsed, the collapse was well maintained, and all cavities were closed; some of those patients with unsatisfactory results were benefited.

Eighteen patients had acute exudative tuberculosis and, for the most part, these patients were doomed without collapse therapy. In this group, the operation was thought to be life-saving, with much less risk than that associated with other procedures. There were 42 patients with fibroulcerative tuberculosis, cavity formation, and positive sputum. All of these patients were very poor risks. There was one immediate operative death among patients with unilateral disease; there were 10 deaths among those with bilateral disease. The alternative to extrapleural collapse in these patients with far-advanced infection was to let them die of their disease; however, many were in fair condition to tolerate one major surgical procedure. Extrapleural collapse offers hope of ultimate recovery with a minimal decrease in pulmonary function.

Complications may be listed as: (1) tuberculous extrapleural empyema, (2) intervening reopening of the cavity, (3) delayed healing of the extrapleural wound, (4) sudden loss of space postoperatively, and (5) moveable upper mediastinum.

In most cases, it is believed that an extrapleural pneumothorax tends to be absorbed even when it has been in effect for long periods of time. This occurred in spite of the complicating tuberculous empyema and after oleothorax. Frequent refills during the first year were necessary.

In 3 patients the cavity was never fully closed; in 9 patients a closed cavity reopened; in 4 patients the space was abandoned; mixed infection empyema occurred in 3 cases; poorly healing wounds occurred in 8 cases.

The author feels that 15 of the 16 failures were preventable, and were due to faulty technique or unavailability of antibiotics at the time of surgery.

The 17 operative deaths were thought to be due to (1) poor cardiorespiratory function, (2) vagal reflex irritation, (3) empyema of extrapleural space, and (4) broncho-extrapleural fistula.

Proper selection of patients is important and it is believed that those with extremely poor cardiorespiratory function should be excluded. Postoperatively, 200,000 units of penicillin, 1 gm. of streptomycin, and 10 c.c. of 20 per cent solution of paraaminosalicylic acid were instilled into the extrapleural space daily during the first postoperative week. This was repeated every other day during the second week, and twice weekly thereafter until fluid no longer accumulated. Careful mobilization of the lung is important in preventing fistula formation. The portion of the pleura on the mediastinal side should not be stripped, but left in place so that the forces on the cavity have a fixed point on which to act in closing the cavity. The author believes it is not necessary to collapse immediately and completely the mobilized lung in order to prevent readherence to the chest wall. He feels that complete collapse can be brought about gradually, giving the patient time to accommodate to the collapse. He uses a short wound which is located posteriorly midway between the vertebral border of the scapula and the spine. Postoperatively, small quantities of air (100 c.c. or less) are given frequently. Plombage is delayed until adequate collapse is obtained.

The author emphasizes the fact that this procedure is advisable in a carefully selected group of poor risk patients in whom other methods of therapy are unsuccessful or contraindicated. He feels that in these cases, this is their only chance of improvement.

ROBERT E. FLORER, M.D.

The Pulmonary Artery in Bronchiectasis. WALTER G. GOBBEL, JR., JOSEPH GORDON, and GEORGE J. DIGMAN. *J. Thorac. Surg.*, 1951, 21: 385.

The authors injected the pulmonary arteries and bronchial tree of normal, bronchiectatic, and tuberculous lungs with iodized oil. The patterns of the vascular and bronchial markings were then studied roentgenographically. It was found that the pattern of the pulmonary artery in bronchiectasis of the nontuberculous lung was the same as that seen in uninvolved lungs. In the lungs showing fibrocaseous tuberculosis, many of the larger branches were shortened, narrowed, and irregularly distributed; and a marked paucity of the smaller branches was noted in areas of fibrotic disease, with complete absence in areas of caseation.

From this study, and previous studies and reports, the authors conclude that the increase in

arterial oxygen saturation following resection of bronchiectatic portions of the lung, is due to the removal of adequately circulated but poorly ventilated lung tissue which acts as a venous-arterial shunt mechanism. In contrast, the findings of normal oxygen saturation in pulmonary tuberculosis at rest, despite the loss of considerable pulmonary tissue, is due to the absence of circulation in the poorly ventilated areas of fibrocaseation.

JACOB T. BRADSHER, JR., M.D.

Lymphangitic Carcinomatosis of the Lungs: 6 Case Reports and a Review of the Literature. THEODORE E. HAUSER and ARTHUR STEER. *Ann. Int. M.*, 1951, 34: 881.

Lymphangitic carcinomatosis of the lung often presents a difficult diagnostic problem because of the bizarre clinical manifestations present in such a condition. The most striking and most constant finding is severe dyspnea, which is progressive. Cough frequently occurs and is usually productive of small amounts of white tenacious sputum which may occasionally be blood-tinged. Other signs and symptoms are pleuritic chest pains, cyanosis, low grade fever, weight loss, anorexia, and weakness.

Physical examination frequently fails to explain these severe respiratory symptoms. Examination of the lungs discloses relatively few signs. The roentgenogram of the chest is often diagnostic since it reveals a pattern of thin, stringy lines with frequent interweavings which branch out from the region of the hilar areas of the lung. If such a roentgenogram is seen of a patient with the above-mentioned symptoms, and miliary tuberculosis, fungus diseases, and occupational diseases are ruled out, lymphangitic carcinomatosis of the lung should be suspected. Of all sites, the stomach should be the first to be suspected.

The method of spread of any neoplasm to the lymphatics of the lung probably occurs by retrograde lymphatic permeation whereby the tumor cells grow along the lymphatic channels. With respect to lymphatic spread from carcinoma of the stomach, it has been suggested that the malignant disease spreads along the paraesophageal lymphatics, then through the hilar anastomosis to lung parenchyma, as well as through the hematogenous route.

ORVILLE F. GRIMES, M.D.

The Obliteration of Residual Cavities after Thoracoplasty, According to 32 Observations. (À-propos de l'exérèse des cavtés résiduelles sous thoracoplastie; d'après trente-deux observations). M. BÉRARD and L. GRÉZARD. *Lyon chir.*, 1951, 46: 147.

In spite of the progress made in the technique of thoracoplasty, the risk of postoperative residual cavity formation still persists.

Residual cavities occur in from 15 to 20 per cent of all cases of thoracoplasty.

Clinically, the existence of a residual cavity can be masked in different ways. In some patients, who are benefited by the procedure or considered well, the presence of a residual cavity is found only on roentgenological examination. The remnant of a pulmonary stump or the consistency of atypical rib regeneration may render difficult the interpretation of an ordinary x-ray film. Often a flattened fissure hidden under newly formed costal tissue or a cavity situated in the "posterior dead angle" escape detection.

Usually the presence of a residual cavity is clinically evident. The presence of tubercle bacilli in the expectoration indicates the process is still active or has been reactivated.

Residual cavities present real dangers, such as hemoptysis, local reaction, and contralateral dissemination.

The cavities may be due to a fault in the operative technique itself. The thoracoplasty may be unsatisfactory on account of the number of ribs resected, or because of the removal of too little of the rib in front or back. Sometimes the failure may be due to the fact that the thoracoplasty operation has been delayed too long.

The character of the lesion may be responsible for the failure of the postthoracoplasty cavity to collapse. The lining of the cavity may be very rigid, the parenchyma may have lost its ability to retract, or the cavity may be surrounded by an intense process of pleuritis. The large size of some cavities plays a role. The extensive loss of lung substance, e.g., an entire lobe, tends to reduce the chance of closure while in the case of a smaller cavity surrounded by sound parenchyma closure occurs more easily. The seat of the cavity is also important. Parahilar and apical cavities do not collapse easily.

Bronchial lesions are an important factor in the formation of residual cavities in cases of tuberculosis and in collapse therapy in general.

The authors operated upon 32 patients since 1948. On 3 patients lobectomy was performed and on the remaining 29 total pneumonectomy was performed. From their operative experience, they have concluded that ultimate postoperative success demands sacrifice of the entire lung.

Thoracoplasty, as done by the authors, is performed by resection of the fifth or sixth rib, when one or the other has been spared. When the thoracoplasty is extended up high, it is centered over the pedicle and the resection of the flap of regenerated tissue is not always easy.

It is necessary to locate in the anterior part of the wound the remaining segment of the fifth or sixth rib, the resection of which serves as a guide posteriorly which follows the line of periosteal regeneration. At this level, resection of the wall of reossification will give a sufficient opening.

The liberation of the lung itself is not easy. This at first follows the configuration of the hemithorax. The pulmonary stump forms a small tongue insinuated in a narrow slit between the newly formed rib plate and the mediastinum. The ad-

hesions at the extreme summit are very dense and very difficult to cut. Another thing that complicates the surgeon's job is the extreme thinness of the cavity walls.

In dealing with the pedicle, the authors take great care in closing the bronchus. After the pleuralization of the bronchial stump, the thorax is closed with nonabsorbable sutures. Drainage in cases of pneumonectomy is instituted at the lowest part of the wound, if the volume of the endothorax cavity is limited. On the right side, drainage is important, for a limited accumulation of fluid can lead to suppression with grave consequences on the heart.

Drainage is routine in lobectomy and is double. One drain is placed in the lowest point of the wound for drainage of the secretions and a higher drain is put into the wound to permit re-expansion of the lobe.

The patients who have been operated upon since 1948 have benefited from the use of modern anesthetics, tubation, curarization, pulmonary suction, and antibiotics.

Of the 32 patients operated upon by the authors, 1 died on the operating table. Two died early after operation, one from an asphyxial episode and the other from pulmonary edema. Three of them died late after operation, 2 from empyema and 1 from a bronchial fistula. One died 12 months after operation from compression phenomena following hemorrhage in the right chest, the site of previous operation.

In the rest of the cases postoperative recovery was simple and complete.

The authors believe that radical intervention in the treatment of residual cavities after thoracotomy is indicated. Their results justify the pulmonary sacrifice which they must make.

To a certain extent advanced age places a restriction on the use of this operation.

The general condition of the patient is a relative matter.

Often at the time of operation when lobectomy has been thought to be indicated preoperatively, pneumonectomy has to be performed because the tuberculous process has spread to the upper lobe. The good results which the authors have obtained by radical operation compensate for the loss of lung suffered. BLACKWELL MARKHAM, M.D.

Primary Results in Attempts at Autoplastic Reimplants and Homoplastic Transplants of Pulmonary Lobes (Primi rilievi su tentativi di reimpianti autoplastici e di trapianti omoplastici di lobi polmonari). V. E. STAUDACHER, P. BELLINAZZO, and A. PULIN. *Chirurgia*, Milano, 1950, 5:223.

Autoplastic reimplantation of pulmonary lobes in dogs was performed. The primary results were poor in that all pulmonary veins were thrombosed when primary suture was used; however, results were good when the nonsuture method of anastomosis with vitallium tubes was resorted to. The middle lobe on the right side was removed and then reanastomosed; the retrocardiac lobe was excised in order to facilitate the procedure. Homoplastic transplants were performed on dogs of similar size and age. The right lower lobe was transplanted from one dog to the other.

The autoplastic reimplants were successful as demonstrated by histologic and functional studies made 12 or more days after the anastomosis. In homoplastic transplants, the immediate good results lasted for 6 to 8 days. After this there was vascular thrombosis, bronchial suture dehiscence, necrosis, and elimination of grafted parenchyma.

LUCIAN J. FRONDUTI, M.D.

The Use of Streptokinase-Streptodornase in the Treatment of Chronic Empyema: With an Interpretive Discussion of Enzymatic Actions in the Field of Intrathoracic Diseases. WILLIAM S. TILLETT, SOL SHERRY, and C. THOMAS READ. *J. Thorac. Surg.*, 1951, 21: 325.

The detailed course of chronic protracted empyema in 10 patients who were treated with instillations of solutions of streptococcal concentrates containing streptokinase-streptodornase (SK-SD) is described as illustrative of the successful, partially successful, and unsuccessful results of local enzymatic therapy.

Four out of 5 of the patients who were treated with SK-SD and antibiotics, healed relatively rapidly. In the remaining 5 patients, the use of SK-SD was purposely instituted, in preparation for subsequent surgical procedure. In 3 of these, the enzymes afforded a sterile field in which to operate, and the presence of fresh granulation tissue was observed. In 1 patient a partial effect was obtained. In the fifth, there was no apparent effect of the enzymes on the pathologic tissues.

The potentialities of enzymatic therapy as a practical measure, and as a special method of investigation into the underlying characteristics of chronic infections are emphasized. If the special advantages to be obtained from the use of SK-SD in patients with empyema or hemothorax are to be most effective, the enzymatic form of therapy should be employed before the difficulties inherent in chronicity have become established. SAMUEL KAHN, M.D.

The Use of Streptokinase-Streptodornase in the Treatment of Postpneumonic Empyema. WILLIAM S. TILLETT, Sol SHERRY, and C. THOMAS READ. *J. Thorac. Surg.*, 1951, 21: 275.

The authors review 25 cases of postpneumonic empyema in patients who were treated with streptokinase and streptodornase (SK-SD). Twenty-one of the patients were treated without recourse to surgery; in 4 patients, solutions of SK-SD were used in association with closed thoracotomy. In most cases a mixture of approximately 200,000 units of SK and 60,000 units of SD, in 20 c.c. solution, were used.

The enzymatic solution, usually 20 c.c., is introduced intrapleurally after the removal of as much exudate as possible. Aspiration is then performed

12 to 18 hours later in order to remove the pus, permit evaluation of the degree of pulmonary expansion, remove residual toxic materials, and allow leucocytes, serum, and antibiotics to make contact with the offending bacteria. If residual deposits are found, injections are employed 2 to 4 days later. Increased quantities of fluid were removed after SK and SD injections. This was due to the thinning effect of the enzymes on the viscous coarse material and the fusion into a single area of loculated pockets. Furthermore, the local irritating effects in the preparations evoke an outpouring of fresh serum and leucocytes. In 2 cases, a previously sterile fluid became strongly positive for organisms. This was thought to be due to the liquefaction of the thick material in the pleura, allowing the organisms access to the pleural fluid.

SK-SD has not proved bactericidal or bacteriostatic; it has removed the barrier between the humoral and cellular elements of the body and the bacteria. Antibiotic medication is much more effective after enzymatic liquefaction. In 4 patients, closed thoracotomy, associated with SK-SD, was used with highly favorable results.

ROBERT E. FLORER, M.D.

Pathology of Pleural Sclerosis; A Study Related to the Loss of Expansivity of the Lungs and Its Treatment. OSCAR C. CROXATTO and RUBEN SAMPIETRO. *J. Thorac. Surg.*, 1951, 21: 259.

The authors' study is based on material obtained from more than 200 post-mortem examinations of patients with chronic pulmonary tuberculosis and 138 surgical specimens removed in the treatment of a great variety of conditions. Furthermore, the visceral pleura of over 100 lungs of dogs was studied following ligation of the pulmonary artery, vein, or bronchus.

The author points out that the superficial parts of the pleural layers, being formed by the mesothelium, are similar; however, the deeper layers are different. The visceral pleura has a connective vascular layer which penetrates into the lung tissue via the interlobular bands. The subpleural layer of the parietal leaf forms a continuous connective layer with fatty tissue separated from the deeper layers by an elastic lamina. This layer is known as the endothoracic fascia, and forms an anatomic cleavage plane which does not exist in the visceral pleura. The integrity of the mesothelium is necessary for the free movement of the pleural leaves upon each other. Any disturbance in circulation in the subpleural areas brings about destruction of the mesothelium. There is a functional difference between the two layers; the parietal pleura is able to move independently of the deep layers, whereas the visceral pleura is firmly attached to the lung.

The author mentions three successive stages in the formation of adhesions. The first stage is that of fibrogenesis as a direct result of the intervention; the second stage is one of antigenesis in which the formation of blood vessels predominates, and which lasts up to 15 days; the third stage is a period of fibrosis which lasts about 10 days. In this last stage, most of the blood vessels disappear and the few which remain become larger in size.

The author differentiates the various reactions of the pleura to "internal aggressions and external aggressions." Internal aggressions are injuries to the pleura as a result of disease in the underlying tissue, whereas external aggression is disease in the pleura as the result of some external agent. Pleural reactions from external causes vary with the condition of the lung. Given a normal lung and a persistent pleural cavity, a pleural shell, or peel, is formed in the presence of external aggression such as empyema, hemothorax, or pneumothorax. The membrane which forms over the visceral pleura early in the condition may be removed with ease, whereas the membrane on the parietal pleura is much more adherent. This parietal peel is removed by dissection in the plane of the endothoracic fascia. The difference in pleural reaction is explained by the differences between the two leaves, both anatomically and functionally. A period of about 30 days is required for adhesions to become completely formed.

ROBERT E. FLORER, M.D.

HEART AND PERICARDIUM

Experimental Researches into Hypothermia as an Aid in the Surgery of the Heart. I. BOEREMA, A. WILDSCHUT, W. J. H. SCHMIDT, and L. BROEKHUYSEN. *Arch. chir. Neerl.*, 1951, 3: 25.

The development of intracardiac surgery has been hampered by the evident enormous loss of blood and the necessity for maintaining the circulation to sustain life. Drainage of the heart would enable inspection and surgical repair to be accomplished. The artificial heart has been developed in an effort to circumvent the heart, allow drainage and, at the same time, maintain the circulation of the blood systemically. However, the artificial hearts so far developed are complicated and may endanger life if minor disturbances develop in their action. The authors have approached the problem from the other direction, i.e., in attempting to find conditions compatible with life which would require less tissue oxygen and make possible a temporary cessation of the circulation. Experimentally, the heart can be adequately drained by the temporary clamping of the vena cavae for 5 to 7 minutes, but this is not sufficient time for an intracardiac surgical procedure. Clamping the vena cavae longer than 7 minutes leads to ventricular fibrillation or to organic brain damage from anoxemia.

The authors used refrigeration or hypothermia to reduce the metabolic rate and thus reduce the need for oxygen by the tissues. Dogs were subjected to general anesthesia, and a small spiral glass tube immersed in a water bath of 5 degrees centigrade shunted the blood from the femoral artery to the femoral vein in the same extremity. By this means "central cooling" of the body was possible. Immersing the glass tube in warm water up to 42

degrees centigrade would bring the body temperature back to normal. Even though rapid cooling occasionally produced localized cooling of the heart and complete heart block, this method was better tolerated by the animal than a slow cooling leading to exhaustive shivering. In 19 dogs, the thorax was opened when the body temperature reached about 26 degrees centigrade, the vena cavae were clamped, and the circulation was interrupted for 10 to 20 minutes without causing permanent pathologic changes. This is three or four times as long as is the case in an animal of normal temperature. An intracardiac operation was performed in 8 cases, the heart was found to be drained of blood, and 2 of these animals are alive and well after 9 months. The slowed cardiac contractions noted at 26 degrees centigrade were even more retarded by clamping off the circulation. A complete stoppage of the heart action occasionally was observed and usually responded to direct warm normal saline solution in the thoracic cavity.

Therefore, with the help of the cooling of the body, the metabolic rate in animals dropped low enough for the brain to be able to dispense with the circulation of the blood for a much longer period than would normally be the case. In consequence of this, the circulation could be interrupted for a period three times as long as normal, time to open the heart practically drained of blood, perform an intracardiac operation, and have the animal survive. CHARLES C. HENDERSON, M.D.

Treatment of Active Tuberculous Pericarditis by Pericardiectomy. EMILE HOLMAN and FORREST WILLETT. *J. Am. M. Ass.*, 1951, 146: 1.

Tuberculous pericarditis is characterized by a prolonged course exhibiting, in the acute stage, chills, sweats, fever, rapid pulse, dyspnea, increased sedimentation rate, luecocytosis, anemia, pericardial friction rub, and pericardial effusion sufficient at times to produce cardiac and vena caval compression as shown by increased venous pressure, absence of ventricular pulsations on fluoroscopy, and reduced voltage in the QRS complex and inverted T waves in the electrocardiogram. Such effusion may persist or subside, as shown by reduction in the size of the cardiac shadow. Such subsidence of signs of effusion may be followed promptly by the signs and symptoms of cardiac compression due to contracture of the inflamed and thickened pericardium. The venous pressure may again become greatly elevated; persistent pleural effusion may necessitate repeated aspirations; ascites may develop, and complete and chronic invalidism may follow. It is suggested that the insidiously and relentlessly progressive character of tuberculous pericarditis demands consideration of operation at a much earlier stage than has heretofore been practiced, and that pericardiectomy should be performed at the time of pericardial effusion, particularly if evidence of cardiac and vena caval compression is present. It is strongly urged that when the diagnosis of cardiac compression can be made clinically, either in the stage of pericardial effusion or in the stage of pericardial contracture, there is great need for prompt cardiac decompression. In a very ill patient with tuberculous pericardial effusion such decompression might best be effected by removal of the left sixth costal cartilage for evacuation and drainage of the pericardium, followed at a second stage, 10 to 20 days later, by median sternotomy and complete anterior pericardiectomy. Despite improvement after the first operation, the second operation must not be omitted.

Five patients with proved tuberculosis of the pericardium, in all of whom the disease was active at the time of operation, as indicated by positive cultures of tubercle bacilli in 4 patients and by the demonstration of tubercle bacilli in the tissues of the fifth patient, were treated by radical pericardiectomy with resulting cure in 3, and marked and still progressive improvement in 2 patients. All operative areas healed by first intention despite the presence in the pericardium of active tubercle bacilli. CHARLES BARON, M.D.

ESOPHAGUS AND MEDIASTINUM

The Retrocardial Space and Contrast Visualization of the Esophagus in Older Individuals (Retrokardialraum und Oesophaguskontrastdarstellung im hoeheren Lebensalter). OTTO HUELNHAGEN. *Fortsch Roentgenstrahl.*, 1951, 74: 187.

In many cases the visualization of the esophagus by means of barium paste leads to important conclusions regarding the configuration of the retrocardial space and especially of the posterior wall of the heart. Under normal conditions the posterior wall of the heart is formed by the left atrium only, which causes a slight impression on the shadow of the esophagus in roentgen films. However, in mitral stenosis and insufficiency the enlarged left ventricle presses against the esophageal wall and produces characteristic deviations toward the back and to the right.

In this article the author discusses the difficulties in interpreting the deviations of the esophagus shadow in older persons. In advanced age the connective tissue between the aorta and the esophagus becomes denser, and the esophagus follows more closely the curvatures of the aorta, so mitral stenosis may be simulated in cases in which no enlargement of the heart is really present. Senile kyphosis of the dorsal spine is another factor which makes correct interpretation of the esophagus difficult in elderly patients. WERNER M. SOLMITZ, M.D.

Benign Strictures of the Esophagus. PAUL H. HOLINGER and KENNETH C. JOHNSTON. *Surg. Clin. N. America*, 1951, 31: 135.

Benign strictures may be (1) congenital, and may be noted first as dysphagia, by the pediatrician. This type of stricture is due to an anatomically shortened esophagus with a secondarily narrowed

cardia, esophageal stenosis, or levels of narrowing in the esophagus. While the infant is fed liquids in the first 5 months of life, no symptoms are noted, but with regurgitation and drooling, and finally food or foreign body impaction, study by endoscopy comes to reveal the anatomical defect.

Stenoses may be (2) traumatic. This group is made up largely of patients who have ingested caustics accidentally or with suicidal intent. Examples of such solutions are clorox, drano, sani-flush and other sodium hydroxide and sodium carbonate solutions.

In a review of 96 such patients, the authors found that 74 patients had swallowed one of the caustics mentioned; 9 had swallowed ammonia; 8 were "medicine cabinet" accidents which included the ingestion of iodine, nitric, sulfuric, carbolic, or muriatic acids; 55 of the 74 patients were below the age of 5; in all but 3 cases, carelessness was at fault, the solution being kept in a cup, glass, coca cola bottle, or other vessel normally used for drinking. The second group consisted of boys between the ages of 5 and 10 who drank caustics from the original container on a dare. The third group consisted of girls, 12 to 20 years of age, who attempted suicide because of some puppy-love affair or parental disciplining. The final group were made up of 25 women, all over 20 years of age, and 9 males. All of these latter, except 3,were psychopathic personalities.

In all cases, treatment is first for the acute burn: weak antidote solutions—for lye, weak vinegar or orange juice, and for acids, sodium bicarbonate solutions. The feeding tube is avoided if possible; tracheotomy is done if edema is marked; adults are watched for repeated attempts at suicide; intravenous nourishment or gastrostomy is done to support nutrition. At this stage the patient should be forced to swallow a string to maintain esophageal lumen. Due to the influence of Salzer's work in Vienna, active treatment is begun early. Within the first 24 hours bougie dilatation is begun, working up to a No. 30 for infants, and a No. 40 to No. 50 for adults. Daily dilatations are reduced to every third or fourth day, and then once a week, twice a month and, finally, once a month. Once the esophagus has been burned, stricture may develop at any time —2, 5, or 10 years later.

Management of chronic stricture comprised two-thirds of the series of 96 patients. The techniques involved are (a) passing olive-tipped bougies over a string; (b) retrograde dilatation through a gastrostomy, a Witzel type being preferred; (c) as a last resort, esophagogastropic dilatation; or (d) surgical resection in cases of complete atresia.

Stenoses may be (3) postsurgical, as in postresections of the esophagus for carcinoma, for acquired or congenital stenosis, or for chronic inflammatory lesions. Response to these strictures is slow. Therapy for the postoperative congenital esophageal atresia should begin immediately by the passing of bougies over a thread passed at the earliest sign of dysphagia. Similar treatment is recommended for postdiverticulotomy strictures.

Plummer-Vinson, or atrophic, esophagitis is treated by medical measures and by frequent dilatations for the stenosing lesion which develops at the esophageal introitus. Peptic ulcer of the lower third of the esophagus, related to a variety of anatomical and physiological causes, is associated with hematemesis in 50 per cent of cases, and pain on swallowing. Esophageal stenosis follows, with healing and fibrosis of the ulceration. These lesions tend to be resistant to esophagoscopy and dilatation, and are easily resected surgically.

Clinically, one becomes suspicious of a lump in the throat; the roentgen picture can give a tentative diagnosis of stenosis; but esophagoscopy is absolutely essential for establishing the diagnosis of stenosis and eliminating the possibility of carcinoma of the esophagus.

JANE C. MACMILLAN, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Complications and Recurrences Following Repair of Inguinal Hernia. ALBERT H. LEVY, ROBERT S. WREN, and MURRY N. FRIEDMAN. *Ann. Surg.*, 1951, 133: 533.

The authors review 1,001 inguinal herniorrhaphies performed on 848 male patients, with particular attention to the complications and recurrences after such repairs; 27.8 per cent of the patients were 50 years of age or older. The Bassini method was used in the repair of 654 hernias and the Halsted technique was used in 317. Cooper's ligament repair was used in 23 cases. Almost all of the repairs were done under spinal anesthesia. Silk sutures were used. The patients were actively ambulated the day following operation, and they were discharged from the hospital 7 to 10 days later.

There were no deaths in this series. Pulmonary complications occurred in 26 patients, being atelectasis and/or pneumonitis in most cases. Wound complications occurred in 38 cases (17 of these were infections and 21 were hematomas or hemorrhage). Other, less frequent, complicating diseases were thrombophlebitis, urinary retention, transection of the vas deferens, enterotomy, and late suture sinuses. Injury to the vas deferens occurred in 5 patients.

Follow-up observations were made on 608 patients (85.6 per cent of 710 operations); 490 patients (60%) were followed for at least a year, the average length of follow-up being 20.2 months. The recurrence rate was 4.6 per cent for all patients operated upon in the 2 years, and 6.7 per cent for those who were followed a year or longer. Poor results occurred most frequently after the Halsted repair for direct hernia; 48.9 per cent had an indirect type of recurrence and 46.1 per cent had a direct recurrence. The authors collected a series of 1,282 recurrent hernias reported in the literature. In this group 671, or 52.3 per cent, had an indirect recurrence, a figure closely paralleling that of the author's presentation.

The authors stress the need for repair of the lateral portion of the canal. They do not believe in routine subcutaneous transplantation of the cord. The need for avoiding a single standardized technique for the repair of all hernias is emphasized.

DONALD C. GEIST, M.D.

The Inversion Operation in Femoral Hernia. C. CRAIG. *Austral. N. Zealand J. Surg.*, 1951, 20: 195.

The approach to the repair of femoral hernia presented in this article is an interesting deviation from current thought in the United States.

An oblique incision over the femoral sac just inferior to the inguinal ligament is made first. The sac is freed. The author calls attention to the fact that the sac is made up of an external layer of cribriform tissue and transversalis fascia, an intermediate and frequently quite thick layer of areolar tissue, and, finally, the internal peritoneal sac which not infrequently is quite small. If possible, the two outer layers are dissected off from the peritoneal sac and the neck of the latter is freed as high as possible in the femoral canal under Poupart's ligament.

A second incision is then made from 2.5 to 3.5 cm. above Poupart's ligament at the lateral border of the rectus muscle. This short incision is deepened into the peritoneal cavity. If the femoral sac has not been previously found in the lower wound, a curved urethral sound is now passed into it, from the superior wound through the peritoneal cavity. The neck of the sac is freed further in the femoral

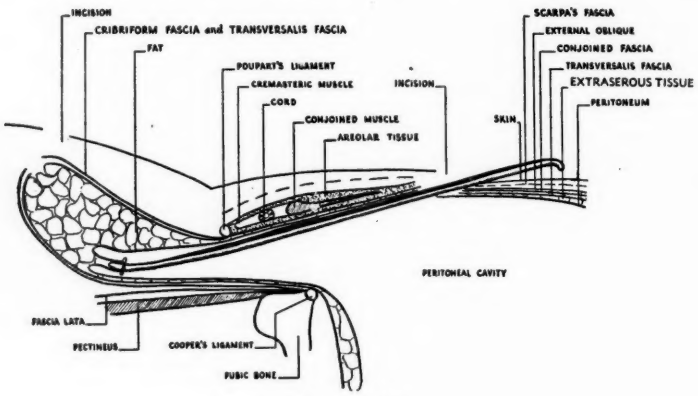

Fig. 1 (Craig).

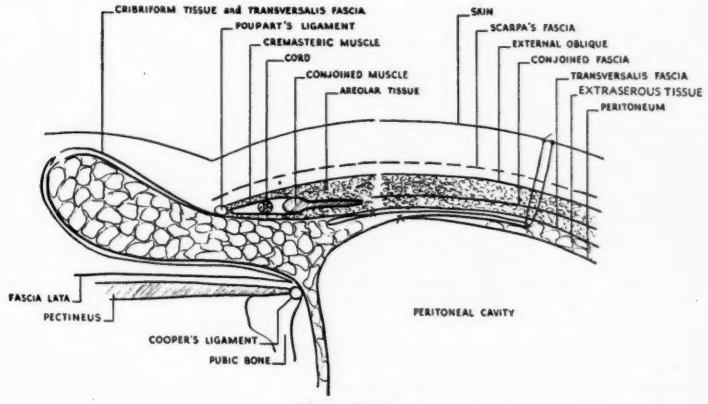

Fig. 2 (Craig).

canal. A McCormick dissector is passed from the peritoneal cavity into the sac (Fig. 1) and through a hole made in the fundus of the sac. The sac is tied to the end of the dissector and the latter is pulled back into the upper wound, which inverts the femoral sac through the peritoneal cavity and into the abdominal wound. The inverted tip of the sac is then pulled into a tunnel between the transversalis muscle and the peritoneum with a long suture passed through the skin into the tunnel, then through the sac, and again through the tunnel and the skin (Fig. 2). The wounds are then sutured, unless the surgeon wishes to combine an inguinal fascia repair with this procedure. However, the author believes that the great advantage of the inversion procedure is that it avoids opening the inguinal fascial structures and the resultant possibility of a direct inguinal postoperative hernia.

FREDERICK C. HOEBEL, M.D.

Hernias of the Suspensory Ligament of the Liver (Hernias del ligamento suspensorio del higado). VELARDE PÉREZ-FONTANA. *Prensa méd. argent.*, 1951, 38: 239.

Under the name of hernias of the suspensory ligament of the liver, the author includes umbilical, epigastric, ensiform, costodiaphragmatic, retrosternal, and paraesophageal hernias. All of these hernias are considered to have a common pathogenesis—a prehernial lipoma. The subject is nicely illustrated with interesting cases.

WILLIAM E. RICKETTS, M.D.

Clinical Factors Affecting the Mortality in Strangulated Hernia. HAROLD LAUFMAN and JORDAN DANIELS. *Arch. Surg.*, 1951, 62: 365.

In the authors' opinion, evaluation of the clinical factors affecting the mortality in strangulated hernia from the clinical standpoint is necessary in the light of recent investigative work and improved methods of management. This report analyzes a series of 100 consecutive cases of strangulated hernia in which operation was done at the Michael Reese Hospital, Chicago. An attempt was made to analyze certain clinically measurable factors which might affect the prognosis and mortality. The series included only cases in which there was definite interference with the circulation. The factors which were considered clinically measurable were age and sex, duration of the symptoms, type of the hernial constriction, length of the involved segment, character of the peritoneal fluid, type of operative therapy, and the preoperative and postoperative care. The findings were subjected to statistical analysis in order to determine the significance of each factor, as far as the material would allow. The over-all mortality in this series was 12 per cent.

Regarding age and sex, the group with the highest mortality rate was composed of men between the ages of 50 and 79. With respect to the duration of symptoms, it was found that the duration of the symptoms and the mortality had a direct relation to one another. On the other hand, the incidence of gangrene bore no relationship to the duration of the symptoms. It was shown that in 1 patient there may be gangrenous bowel after only 5 hours of symptoms, while in another the bowel may be viable after 120 hours of symptomatic strangulation. Inguinal hernia accounted for 62 per cent of the strangulations. Deaths from various types of hernias showed no significant predominance of one type over the other; however, the incidence of strangulation in inguinal hernia was higher than is commonly supposed. The mortality was significantly increased when the involved segment was long. It was found that the character of the sac fluid may serve as a prognostic sign. When it is cloudy or consists of gross blood one must suspect irreversible damage to bowel.

Errors in judgment of viability occurred in 3 cases. The mortality rate for resection and primary anastomosis was 15.8 per cent. The mortality rate for replacement was 9.1 per cent.

The main features of preoperative and postoperative care which have lowered the mortality rate include the judicious use of suction, parenteral fluid and electrolyte therapy, and blood and plasma replacement. Antibiotic therapy has proved to be of inestimable value in reducing the toxicity and mortality in this condition.

The 12 mortalities were analyzed from the standpoint of whether the deaths were conceivably avoidable. As far as the analysis would allow, there were 6 deaths which could be termed avoidable. Of these, 3 were due to errors in judging the viability or impending perforation, and 3 were surgical errors of other types. The 6 deaths which were considered unavoidable were due to other complicating disease processes. Thus, the unavoidable mortality rate at present appears to be in the neighborhood of 6 per cent. These figures reflect an improvement in the surgical results and indicate that good surgical management can further lower the existing mortality rates. HAROLD LAUFMAN, M.D.

GASTROINTESTINAL TRACT

Bilateral Vagotomy for Gastric Ulcer (La vagotomia bilaterale nella malattia ulcerosa gastrica). GIAN CARLO PERACCHIA. *Minerva med.*, 1951, 42: 329.

Confining his discussion to gastric ulcers treated by subdiaphragmatic vagotomy alone, the author believes that this operation has a definite place in the armamentarium of the surgeon. The study is based on 56 cases of peptic ulcer treated by section of the vagi, with or without associated procedures, of which 14 were for gastric ulcer.

It is emphasized that, short of a second operation for inspection, one is never sure of complete anatomical healing of the ulcer. X-ray evidence is not certain. It is also still too early to evaluate long term results, because of regrowth of the vagus nerves. Because of these disadvantages, and in spite of the fact that all of his patients were apparently cured and well after 18 months, the author believes subtotal gastric resection is the operation of choice. Vagotomy is considered advisable only in cases of poor risk patients because it is a more simple procedure. The author also advises it for postoperative gastrojejunal ulcers. The sequelae, such as fetor oris, gastric dilatation, and frequent stools, although sometimes persistent, were well tolerated by the patients in this series.

N. CHRISTIAN MEYER, M.D.

Vagotomy for the Cure of Gastroduodenal Ulcers (La vagotomia nella cura delle ulcere gastro-duodenali). PIERO PETRONIO and LUCIANO DEL FABBRO. *Minerva med.*, 1951, 42: 332.

The authors have analyzed 56 cases of peptic ulcer wherein a vagotomy was performed, either alone or associated with gastroenterostomy or other abdominal surgery. The entire series was followed up for at least 18 months. All of the patients lost their ulcer pain, but none regained it during the period of the study; 1 patient, however, required a subsequent gastric resection for persistent vomiting. It was found that most of the patients developed postoperative gastric dilatation which required suction, and 47 of the 56 patients developed intestinal distention. Diarrhea was a frequent sequela, and in some instances persisted 18 months. Many patients complained of foul-smelling eructations.

It was concluded that vagotomy is a useful procedure in the treatment of peptic ulcer because most of the patients were satisfied, the section of the vagi diminished the hypersecretion and hypermobility of the stomach, the pain was relieved, and the operation carried little risk. In spite of postoperative roentgen examination, the anatomical obliteration of the ulcer is never certain, and as permanent cure is still uncertain after vagotomy, the authors believe gastric resection is preferable in the patients who can withstand the more drastic surgery. In this way vagotomy is reserved for poor risk patients and those with stoma ulcers. Vagotomy is contraindicated when there is preoperative hypochlorhydria.

N. CHRISTIAN MEYER, M.D.

Benign Tumors of the Stomach (Tumores benignos de estomago). A. L. C. MAGGI, M. MEEROFF, and A. KUPERMAN. *Sem. méd.*, B. Air., 1951, 58: 403.

The authors report their personal experience with 5 cases of benign tumor of the stomach, 2 of which were neurofibromas and 1 was a leiomyoma; the 2 other tumors were not biopsied nor operated upon.

The authors review the literature comprehensively. The controversial issues centered upon the probable degeneration of benign polyps into frank malignancy, a view which varied from inflexible certainty to the denial of such change, the majority of the opinions holding the change highly probable. A large number of cases were associated with atrophic gastritis, achlorhydria or hypochlorhydria, instances of frank or silent hemorrhage, vague dyspepsias, diarrheas, and anorexia with little or no weight loss. The age incidence varied from childhood to the sixth decade. Definitive diagnoses were made by roentgenological means and gastroscopy. In one series of cases, 56 per cent of the gastroduodenal ulcers were associated with polyps. A large number of cases of von Recklinghausen's disease were associated with neurofibromas of the stomach.

Treatment varied from occasional conservatism controlled by x-rays and gastroscopy to local excision of the tumor mass through a gastrotomy and to subtotal gastric resection. The instances of recurrence were very few.

The incidence of benign tumor of the stomach was extremely variable in various clinics, but the authors indicate that, roentgenologically, the lesion cannot be seen unless it is more than 1½ cm. in diameter. Gastroscopy is mandatory in the search for this lesion.

Generally, the polyp situated near the pyloric antrum should be treated by subtotal resection,

whereas for one in the cardia, local excision may suffice. MIGUEL DROBINSKY, M.D.

Carcinomas of the Stomach. Investigation of the Lymphatic Spread from Gastric Carcinomas after Total and Partial Gastrectomy. REIDAR EKER. *Acta chir. scand.* 1951, 101: 112.

The results of a comparative pathologicoanatomic examination of 70 totally, and 100 partially, resected stomachs in cases of gastric carcinoma are reported. The investigation was concerned mainly with the spread to the regional lymph nodes and the possible correlation between the localization, size, and macroscopic and microscopic type of the tumor and the occurrence of metastases.

This report of the comparative investigation of 100 partially resected and 70 totally resected cancerous stomachs has led to a number of findings which seem to be of practical importance.

The more complete removal of the regional lymph nodes attained through total resection yielded an average of 22.6 lymph nodes per specimen, as against 12.6 in the partially resected material. More important was the finding that the frequency of histologically demonstrable metastases increased from 70 per cent in the partially resected, to 82.9 per cent in the totally resected specimens.

On examination of the distribution of the regional lymph nodes in the 4 zones of lymphatic drainage, it was found that fewer nodes had been removed in the zones situated lowest on the lesser curvature and highest on the greater curvature. In the partially resected material there was a disproportionately greater reduction in the number of lymph nodes along the lesser curvature than in the totally resected material. This seems to be due mainly to incomplete removal of the lymph nodes along the left gastric artery and the celiac artery.

Examination of the splenic lymph nodes in 46 specimens showed metastases to these nodes in 21.7 per cent of the cases. It is of interest to note that of the macroscopic infiltrating forms, chiefly annular in type, no less than 47 per cent showed spread to this group of lymph nodes, while only 1 of 21 expansive tumors examined metastasized to this area. Tumors located in the lower part of the stomach, and even on the lesser curvature, showed a tendency to spread to the splenic lymph nodes.

Thirty-two per cent of the gastric carcinomas located at the upper part of the stomach were found to be invading the esophagus. Most of them had just barely begun to spread to this region, but in 8 per cent of cases the spread extended far upward in the esophagus. The cardia does not present a barrier to the spreading of tumor upwards in the esophagus, as does the pyloric sphincter. In tumors near the esophagus, a more complete removal of the esophagus is therefore necessary in order to effect a radical cure.

In the grading of gastric carcinomas, it was noted that the highly differentiated, expansively growing adenocarcinomas showed less tendency to spread than the other types of carcinoma. The size of the neoplasm is of very little significance in estimating the probable extent of spread beyond what can be directly seen. ROBERT TURELL, M.D.

Bleeding Peptic Ulcer. D. A. FERGUSON and A. L. WYMAN. *Lancet*, Lond., 1951, 260: 814.

The authors report their experience with bleeding peptic ulcer from January, 1947 to October, 1949 at the Whittington Hospital, in London. There were 157 admissions (103 males, 54 females), and 5 patients were admitted twice. This series of cases is not strictly limited to primary peptic ulcer but includes 1 patient with ulcer which showed evidence of malignancy on histologic examination, 1 patient with polyposis of the stomach, and 2 patients who probably had cirrhosis of the liver. Forty-nine patients had chronic gastric ulcer, 48 had chronic duodenal ulcer, 5 had anastomotic ulcer, and 28 had an "acute syndrome" (those in whom an acute ulcer was seen, usually at autopsy, and those who gave a history suggesting an ulcer of less than 4 weeks' duration, although no lesion could be demonstrated); in 23 the ulcer was "not proven" (patients who gave a history of longer than 4 weeks but in whom no ulcer was found).

There were 28 deaths, a mortality of 17.8 per cent. After excluding 2 cases—one, a patient who died of a perforation 3 months later, and one, a patient admitted for a perforated gastric ulcer who bled terminally 5 days after operation—there was a corrected fatality rate of 16.6 per cent.

FACTORS IN MORTALITY

Age. In patients over the age of 50, the mortality from hematemesis or melena was nearly four times greater than that in patients under that age. Of 51 patients under the age of 50, only 3 died (5.9%), and of the 105 patients over 50 years of age, 25 died, a fatality rate of 23.6 per cent.

Sex. There were nearly twice as many men as women, and whereas 23 of the men died (22.3%), only 5 women died (9.2%).

Previous ulcer history and bleeding. In the present series, a history of past ulcer bleeding in a patient with hematemesis and melena does not make the prognosis worse. The length of the ulcer history furnishes no guide in estimating the outlook for the patient with hemorrhage. Those patients with no history of previous dyspepsia carried the highest fatality rate.

Type of lesion. The distribution of gastric and duodenal ulcers was almost equal, but the deaths from bleeding gastric ulcer were about three and one-half times as numerous as those from duodenal ulcer. Of interest is the high death rate among those with "acute syndrome," 4 out of 28 patients (14.3%). Ulceration was demonstrated in 105 patients (67%), about two-thirds of the series.

In attempting to correlate the blood lost and the amount transfused with the clinical course of each patient there was no firm relationship; however, it

is generally known that the rapidity of blood loss is significant and that an equally large amount of blood lost over a longer period of time is much better tolerated than a rapid loss. In addition the hemoglobin may remain high until hemodilution occurs and consequently is not a good index of the amount of bleeding.

There were 18 deaths from chronic gastric ulcer, 5 from chronic duodenal ulcer, 4 from acute ulcer, and 1 death from a clinical, but not proved, duodenal ulcer. Of these patients 6 had had an operation. Six patients had no adequate treatment because their true condition was undiagnosed in life. In 4 men, the bleeding was so rapid and massive that they were moribund before treatment could even be initiated.

Since there was a high proportion of old people in this series, intercurrent disease was common. Excluding hypertension and atheromatous changes, unless there were cardiac and cerebral involvement complicating diseases were prominent in 29 patients. Of these, there were 6 women, of whom 3 died, and 23 men, of whom 12 died. All but 1 of these were over the age of 50. Twelve of these patients had chronic gastric ulcer and 9 of them died. The authors were able to show no significant statistical difference as regards the part played by severe intercurrent disease in causing the great difference in mortality between those under and those over the age of 50. They believed, however, that severe complicating disease and failure of correct diagnosis affected the prognosis adversely in the elderly. In the old, the sick, the anemic, and the demented, memory is vague and the history obscure. Care and great patience are required to enable one to reach the diagnosis before the pathologist does. Their experience has caused them to view with suspicion any anemia of recent onset, even though there is no clear gastric history.

Of the 31 patients treated surgically, 5 died, a mortality of 16 per cent. Twenty of these were "cold" gastrectomies, with 1 death (5%), and the remaining 11 had emergency operations leading to 4 deaths (36%). Twenty-one of those operated upon had gastric ulcer, 8 had duodenal ulcer, 1 patient had an anastomotic ulcer, and 1, a gastric polyposis. All 5 deaths took place in those with gastric ulcer.

Among the 15 patients under the age of 50, there were 5 emergency operations with 3 deaths, and 10 "cold" operations with none.

The authors' conclusion is an interesting and thoughtful one. "In the end all rests on the experience and judgment of the clinician and on the surgical facilities on hand."

LEROY J. KLEINSASSER, M.D.

The Diagnosis of Gastrojejunocolic Fistula (Die Diagnose der Fistula gastro-jejuno-colica). E. GLOECKNER. *Deut. med. Wschr.*, 1951, 76: 267.

The diagnosis of a gastrojejunocolic fistula is of great importance because the unrecognized condition may have a fatal outcome.

The stools are voluminous, consist of undigested food, and contain fat and muscle fibers. The fact that defecation usually takes place shortly after meals is characteristic. In contrast to pancreatic diseases indican is found in the urine, especially after the ingestion of protein-rich food. Hunger is excessive and hypoglycemia may follow the dumping syndrome. Loss of weight is usually observed. Retrograde filling of the stomach with fecal matter is the result of the shortened circuit. Nausea, belching, fetor ex ore, and gradual loss of appetite complete the picture. Enteritis with frequent diarrhea or the syndrome of ileus with fecal vomiting predominates.

The introduction of a stained solution, such as methylene blue, per rectum and its recovery through a gastric tube may help to establish the diagnosis. An opaque medium may be introduced orally or rectally in order to vizualize the fistula.

The author reports 2 cases of gastrojejunocolic fistula. One developed following gastric resection according to the Billroth II method, and the other following gastroenterostomy.

JOSEPH K. NARAT, M.D.

Intestinal Lymph Flow Following Simple Intestinal Obstruction in the Rat. DONALD C. BALFOUR, JR., JESSE L. BOLLMAN, and JOHN H. GRINDLAY. *Surgery*, 1951, 29: 500.

Wangensteen has discussed, on the basis of work previously done, the effects of intestinal obstruction on the intestinal lymph flow. By means of excision and study of the regional lymph nodes following experimental intestinal obstruction, the absorption of vital dyes and bacteria had been determined. These studies indicated that lymphatic flow continued after obstruction of the intestine and that it was increased if there was an increase in intraluminal pressure associated with the obstruction.

The recent development of a satisfactory technique for the collection of intestinal lymph from the rat offered an opportunity to measure the intestinal lymph flow following ileal obstruction. Male albino rats of the Sprague-Dawley strain, weighing from 190 to 220 gm., were fed a standard commercial ration prior to operation. Cannulation of the intestinal lymph vessels was performed by a method previously described.

The hourly flow of lymph from the cannula of each rat often varied during the first 18 hours of observation. This was due to intermittent plugging of the lymphatic cannula system due to the clotting of the lymph and removal of the clots by wire or suction. After 18 hours the flow of lymph was usually very constant, probably because of the hypoprothrombinemia which developed. The intestine was obstructed at approximately this time.

Direct measurement of the flow of intestinal lymph following simple obstruction of the ileum in the rat confirmed previous deductions. Lymph flow continued to be normal, at least in the absence of significantly increased intraluminal pressure.

Motor Disturbances of the Small Intestines in the Gastrectomized Individual (Perturbaciones motoras del intestino delgado en los gastrectomizados). CRISTOBAL PERA. *Rev. españ. enferm. ap. digest.*, 1951, 10: 1.

The author discusses the roentgen appearance of the changes of varied intensity in the small intestine following gastrectomy and during experimental studies carried out in dogs. He found alterations of the motility of the small intestine in only 27 per cent of the patients who had gastrectomies; in 19 per cent the motility was accelerated and in 8 per cent it was retarded. The author does not mention the number in his series of cases.

WILLIAM E. RICKETTS, M.D.

Contribution to the Question of Duodenal Infection and Its Significance in Clinical Diagnosis. J. TOMENIUS. *Acta. chir. scand.*, 1950, 100: 583.

With suction from the duodenum under bacteriologically satisfactory conditions, the author examined the flora of the duodenal juice in 18 normal individuals, in 10 cases of bile duct affection, and in 12 mixed cases. Under normal conditions the duodenal juice is sterile. Half of the 10 cases of bile duct affection (cholecystitis and cholelithiasis) showed the growth of bacteria in the duodenal juice and in the bile from the gall bladder. The cases with positive cultures showed more pronounced clinical symptoms. All the positive cases except 1 had a good hydrochloric acid secretion, so that the infected duodenal juice was regarded as being secondary to a bile duct infection in these cases. Among the positive cases there were 2 cases of choledocholithiasis and 3 cases with roentgenological signs of cholecystitis. The author draws attention to the clinical significance which a demonstration of duodenal infection in these cases may be conceived to have. Such a demonstration is probably to be regarded as an additional indication for operation. In these cases the patients should be treated with antibiotics.

In the mixed cases it was shown that the patients with achylia have a duodenal infection which is considered to be dependent upon the lost hydrochloric acid barrier. A patient with acute fever, abdominal symptoms, and slight meningeal irritation proved to have a duodenal infection, but otherwise nothing objective. Patients with duodenal ulcer, irritable colon, and some nongastrointestinal ailments gave negative cultures of the duodenal juice.

CHARLES BARON, M.D.

Regional Segmental Complications of the Transverse Colon (Les colites segmentaires régionales du transverse). ARNAUD HECTOR. *J. chir.*, Par., 1951, 67: 125.

The author feels that segmental regional colitis of the transverse colon is not particularly a nosologic entity among the colitis syndromes, but that it presents several diagnostic and therapeutic problems to be considered apart from the colitis commonly seen in the region of the cecum or sigmoid. To support his argument he gives in some detail the history, physical findings, and the pathologic anatomy in 3 formerly unpublished case histories, adding to the case histories already published by Bargen and other authors. Some of the illustrations are excellent.

On histologic examination he found the lesions to be characterized by an infiltration of plasmocytes and eosinophils. These areas of dense infiltration were particularly prominent in the deep layers of the mucosa where they seemed to correspond by their density to the degree of overlying ulceration. The author has not had reason to believe that specific vascular lesions are present, as a rule, in the genesis of some of the crises of this disease, such as some American authors have believed. The common clinical manifestations are diarrhea (often bloody), pain (usually localized), fever, loss of weight, anemia, and, on physical examination, evidence of a tumor mass of the transverse colon (hard and movable). The diagnosis can be made so far as localization is concerned with contrast barium roentgenographic studies, but the lesion still must be differentially diagnosed from tumor, amebiasis, tuberculosis, and some of the more common forms of bacillary dysentery. He thinks that the proper treatment is surgical, and that, because of the shocking nature of the operation, it is probably safest to do the resection in two stages.

JOHN MARTIN, M.D.

Volvulus of the Megacolon. Diagnostic and Therapeutic Considerations (Sur le volvulus des mégacolons. Considérations diagnostiques et thérapeutiques). J. SÉNÈQUE and CH. DEBRAY. *Sem. hôp.*, Paris, 1951, 27: 535.

The author reports the case of a man 56 years of age who had suffered from dolichomegacolon for more than 30 years. For many years he had attacks of partial obstruction occurring at irregular intervals, on the average of one every 2 weeks. These crises were elicited by physical exertion, especially train or car rides. When finally the signs of a complete ileus appeared in one of these attacks he was laparotomized, and volvulus of the tremendously dilated left colon was found. The gut was freely movable, not attached to the abdominal wall, and showed a torsion of 360 degrees. One meter of intestine was resected and colostomy performed.

The writer discusses briefly the diagnostic difficulties in the combination of the two pathologic conditions, namely, megacolon and nonattachment of the colon. He emphasizes the importance of repeated x-ray examinations.

WERNER M. SOLMITZ, M.D.

Results of Follow-up Studies on Patients after Operation for Megacolon (Nachuntersuchungsergebnisse bei operierten Megakolonfaellen). W. TŒNNIS and A. HERINK. *Deut. med. Wschr.*, 1951, 76: 265.

Eight children and 3 adults were re-examined at various intervals up to 4 years following an operation for megacolon. The procedure employed consisted

of sympathetic denervation of the distal portion of the large intestines in the form of resection of the presacral nerve and denervation of the inferior mesenteric artery.

The functional results of the procedure were satisfactory in each instance. Although inspection and roentgenographic studies showed dilated loops of the large intestines in some of the patients, defecation was normal and laxatives were required only on rare occasions. JOSEPH K. NARAT, M.D.

Histopathology of Adenomatous Polyps of the Colon and Rectum, With Special Emphasis on the Relationship Between Adenoma and Carcinoma. HARRY E. BACON, JOHN LAURENS, and AUGUSTIN R. PEALE. *Surgery*, 1951, 29: 663.

There is some difference of opinion regarding what constitutes carcinomatous change in adenomatous polyps of the colon and rectum. In the present study 800 cases of cancer of the large bowel were reviewed. The adenomatous lesions were divided into two groups: first, those removed by any one of the following methods: (a) bowel resection, (b) transabdominal colotomy, (c) local excision from below, and (d) electrocoagulation via the sigmoidoscope; and second, those found in an operative specimen following resection, along with the primary carcinoma for which the operation was performed.

The authors feel justified in stating that of a series of 800 carcinomas of the colon and rectum there were 90, or 11.25 per cent, which had their origin in a benign adenomatous polyp, and 30, or 3.75 per cent, which presumably had a similar origin. The criteria for diagnosis of malignancy are based mainly on the length of the pedicle and correlation with microscopic examination. Among 162 adenomatous lesions there were 26 benign adenomas, 16 adenomas with "atypism," 61 adenomata malignum (adenocarcinomas *in situ*), 24 grade I adenocarcinomas, 5 grade II adenocarcinomas definitely arising in adenomas, and 30 polypoid papillary grade II adenocarcinomas which presented evidence of having arisen in adenomas. HAROLD LAUFMAN, M.D.

Congenital Malformations of the Rectum and Anus: with Special Reference to the Treatment of Associated Fistulas. ERNEST E. ARNHEIM. *Am. J. Surg.*, 1951, 81: 538.

Eleven cases of imperforate anus in which the rectal pouch ended blindly some distance above the anus, with an associated fistula, are reported. The type of operation for the treatment of this lesion depends upon the position of the rectal pouch and the possibility of reaching it by a perineal approach. The technique used was essentially that of Ladd and Gross. With the infant in the lithotomy position an anteroposterior incision is made to extend from the scrotum or vagina to the coccyx. The external anal sphincter muscle is divided in the line of incision. Dissection is continued through the perineal fat, the levator ani muscle, and the pelvic fascia, keeping the exposure close to the hollow of the sacrum to avoid the urethra and vagina. The pouch is brought down by means of traction sutures to the pelvic fascia, the levator ani and anal sphincter muscles to the perineal skin. The levator ani and sphincter pouch is opened and the edges of the rectum are sutured to the surrounding skin with interrupted sutures.

If the rectal pouch is 5 cm. or more above the anal pit it is preferable to perform a primary transverse colostomy.

When fistulas are present, dilatation of the fistula should be rarely done and only if the child's condition is poor. Rectoperineal and low rectovaginal fistulas are easily repaired. The rectum is sufficiently mobilized to exteriorize the rectal end of the fistula, the opening of which is utilized for suture to the perianal skin. Attempts to close rectourinary and high rectovaginal fistulas in infants are usually unsuccessful and should be deferred to a later age. Preliminary colostomy may result in the spontaneous obliteration of such a fistula. Occasionally division of the fistula through an abdominal approach may be required. A preliminary suprapubic cystotomy is necessary in the repair of large rectourinary fistulas.

Of the 11 patients whose cases are reported in this article, 10 were cured. Five rectovaginal fistulas were treated, 3 by staged operations and 2 by perineal operation and excision of the fistula. Three rectoperineal fistulas were treated by perineal operation and excision of the fistula. Two rectovesical fistulas were treated by staged operations.

Advantages of the primary abdominoperineal operation are given, but none of the patients in this series was treated by this method. After the first 24 hours of life the roentgenogram can be relied upon as an excellent diagnostic aid. Careful and prolonged postoperative treatment is very important.

HAROLD LAUFMAN, M.D.

Rectal Stenoses and Imperforate Rectum (Sténoses et imperforations du rectum). J. F. NUBOER and H. VAN AKEN). *J. chir., Par.*, 1951, 67: 209.

Ladd and Gross suggested the following classification of anorectal anomalies:

Type I. Stenosis situated from 1 to 4 cm. above the anus. Anus and rectum are patent.

Type II. Imperforate anus.

Type III. Imperforate anus and atresia of the rectum. The latter terminates at a certain distance from the anus.

Type IV. Atresia of the rectum with a normal anus, sphincter, and lower portion of the rectum.

The external sphincter is of mesenchymal origin and as such develops independently from the terminal gut. Hence, it is usually present in patients with anorectal anomalies, although not infrequently it is underdeveloped.

Perineal or genitourinary fistulas are observed in approximately 50 per cent of the patients with stenosis and atresia of the anus and the rectum They occur most frequently in female infants.

In approximately 30 per cent of the cases congenital anorectal anomalies are accompanied by other congenital anomalies.

Patients belonging to the first group are treated with dilatations, first daily, and later at gradually longer intervals.

Patients belonging to the second group are treated by puncture of the membrane, followed by incision and evacuation of meconium.

In patients of the third group an artificial anus is made, and definitive treatment is instituted at an older age to diminish the postoperative mortality.

The same procedure is employed in patients of the fourth group. The second stage is postponed until the patient has reached the age of 5 years. Re-establishment of continuity of the gut in one stage is followed by a very high mortality.

JOSEPH K. NARAT, M.D.

Carcinoma of the Rectum. A Study of Factors Influencing Survival Following Combined Abdominoperineal Resection of the Rectum. E. J. DUNNING, T. E. JONES, and J. B. HAZARD. *Ann. Surg.*, 1951, 133: 166.

This is a report of 102 cases in which a Miles abdominoperineal resection of the rectum was carried out for adenocarcinoma. The specimens were examined immediately after removal. The highest survival rate, as far as distribution of tumor is concerned, was a 5 year survival of 66.6 per cent for lesions which were between 6 and 12 cm. from the anorectal junction, and 70 per cent for lesions with one-half or less of the circumference involved. Only 50 per cent of the patients with the entire circumference of the rectum involved survived 5 years; 90 per cent with no extension into the perirectal fat survived 5 years, and 58.9 per cent with moderate extension survived 5 years, whereas only 43.4 per cent with pronounced extension survived 5 years. The 5 year survival of patients without lymph node metastases was 86.8 per cent. Only 35.3 per cent of those with lymph node metastases lived 5 years, and only 3 of 19 with venous invasion survived for 5 years. Eight of 10 patients with perineural extensions died less than 4 years after operation.

Venous invasion and perineural extension have a grave influence on the prognosis. The features which show a significant effect are microscopic dedifferentiation, lymph node involvement, and penetration into the perirectal fat tissue.

ROBERT E. FLORER, M.D.

Splanchnicectomy: Its Clinical Effects on the Gastrointestinal Tract. JOHN R. ROSS and M. PORTER BROLSMA. *Gastroenterology*, 1951, 17: 389.

In the numerous reports that have appeared on the results of splanchnicectomy for hypertension, several isolated incidences of gastrointestinal complications following operation have been reported.

Two hundred and fourteen cases in which splanchnicectomy had been performed, in most instances for the relief of hypertension, were reviewed at the Lahey Clinic, Boston, Massachusetts, to determine the effect of splanchnicectomy on symptoms of functional origin, and the frequency and type of organic gastrointestinal complications. There was equal sex distribution among these cases, and most of the patients were between 20 and 50 years of age.

Replies from questionnaires were obtained from 131 patients. Eighty-three of the 131 patients had symptoms referable to the gastrointestinal tract. Seventy-seven per cent of patients obtained improvement; 7.2 per cent were worse; and 15.7 per cent were unchanged after the operative procedure. Why patients with these symptoms of functional origin were benefited is difficult to explain. Probably visceral sensation was diminished, and the mode of living of these patients changed after the operation.

The incidence of peptic ulcer or disease of the extrahepatic biliary tract was not altered; however, recognition of symptoms of peptic ulcer activity, or acute disease of the extrahepatic biliary tract, seemed to be delayed after operation owing to interference with pain sensation. When peptic ulcer did appear, hemorrhagic complications of major proportion occurred more frequently than would be expected under ordinary circumstances. Rigid ulcer therapy to insure relief of symptoms when the latter became apparent is suggested to avoid serious complications. It is suggested that diagnostic radiography be employed in all instances in which symptoms suggest a possibility of peptic ulcer or gall-bladder disease.

It is concluded that when this operation is performed and abdominal symptoms appear, the appropriate diagnostic and therapeutic measures be utilized in an effort to avoid potentially serious complications. Clinically functional gastrointestinal symptoms, when present, may be relieved in the majority of instances after thoracolumbar splanchnicectomy.

CURTIS ARTZ, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

The Hepatic, Cystic, and Retroduodenal Arteries and Their Relation to the Biliary Ducts, With Samples of the Entire Celiacal Blood Supply. NICHOLAS A. MICHELS. *Ann. Surg.*, 1951, 133: 503.

This presentation is a report of an anatomical study of the hepatic, cystic, and retroduodenal arteries and their relation to the hepatic ducts. It is based on a careful dissection of the arteries supplying the supramesocolic organs in 200 bodies.

Nomenclature. A hepatic artery arising from some source other than the terminal end of the celiac artery is called an aberrant hepatic artery. An aberrant hepatic artery may be of two kinds: accessory and replaced. The term "accessory" is used when the artery occurs in the presence of a normal right and left celiac hepatic artery. The term "replaced" is used when a normal celiac hepatic artery is missing and is replaced by an artery from another source. "Supraduodenal" is used in the original sense proposed

by Wilkie. "Retroduodenal" is extended and will connote the large artery which forms an arcade on the posterior surface of the head of the pancreas.

The celiac artery. The normal celiac artery arising from the abdominal aorta gives off the left gastric, the hepatic, and the splenic arteries. Additional branches may be the dorsal pancreatic artery, the left or right phrenic artery, and the middle or an accessory middle colic artery. Variational patterns of the celiac axis may be as follows: (1) a hepatolienogastric celiac trunk, occurring in 90 per cent, (2) a hepatolienal trunk, (3) a hepatolienomesenteric trunk, (4) a hepatogastric trunk, (5) a lienogastric trunk, (6) a celiacomesenteric trunk, and (7) a celiaco-colic trunk. The latter varieties form the remaining 10 per cent.

Aberrant hepatic arteries. Some sort of aberrant hepatic artery, either replaced or accessory, occurs in 41.5 per cent of bodies and 31.5 per cent have one aberrant vessel while 10 per cent have two or more. In 200 specimens, 52 (26%) had aberrant right hepatics, 36 of which were replaced and 16 accessory. Fifty-four (27%) had aberrant left hepatic arteries, 31 replaced and 23 accessory. The most common source of an aberrant right hepatic artery is the superior mesenteric artery, and of the left hepatic artery, the left gastric artery. The aberrant hepatic artery is the only left hepatic artery present in 23 per cent of all bodies dissected, and three-fourths of the aberrant right hepatics are replaced right hepatics. The author stresses the importance of these findings to the surgeon in performing gastrectomy and pancreatoduodenal resection.

The cystic artery. Of the 200 bodies, 75 per cent had a single cystic artery and 25 per cent a double cystic artery. One hundred forty, or 70 per cent, of the subjects revealed the cystic artery to arise from the right hepatic artery. In 162, or 81 per cent, of the bodies the site of origin of the cystic artery, whether single or double, was in Calot's triangle. A crossing of the hepatic duct by the cystic artery was found in 50 cases, or 25 per cent. Important to the surgeon is the origin of the cystic artery from an intestinal artery such as the retroduodenal.

Arterial relations. The terminal hepatics are usually quite large in number and vary between 20 and 30, or more. It would appear that the arterial vascularization of the liver, like that of the spleen, is effected in regional units. In the fossa for the umbilical vein and in the region of the caudate lobe, there is extensive and frequent communication between the terminals of all of the hepatic arteries. Careful attention must be paid to accessory hepatic ducts and their arterial relations. The right hepatic artery may cross the accessory duct above or below and the cystic artery may cross anterior or posterior to it. Both inside and outside of the cystic triangle, the right hepatic artery often makes a caterpillarlike loop, bringing it close to the cystic duct and making it vulnerable to surgical injury. Surgically it is well to look for the cystic artery on the gall bladder itself, where it comes in contact with it.

The retroduodenal artery. This artery is the first branch coming off the gastroduodenal artery and is related to the common bile duct anteriorly and posteriorly. It forms the posterior pancreaticoduodenal arcade. It communicates at several points with the anterior arcade. It is quite important surgically in ligations, explorations, and transplantations of the common duct. In addition, it is important in cholecystectomy since the entire cystic artery or its superficial branch may take origin from it. The retroduodenal artery is not to be confused with the supraduodenal which supplies the anterior and posterior surfaces of the first part of the duodenum, is of varied origin, and frequently communicates with other regional arteries.

These various anatomical findings are well illustrated in the original article where all of the anatomical details are completely discussed.

DONALD C. GEIST, M.D.

Benign Stricture of the Intrahepatic Bile Ducts. R. FRANKLIN CARTER and LEE GILLETTE. *J. Am. M. Ass.*, 1951, 145: 375.

Fifteen cases of stricture of the intrahepatic bile ducts at the time of the first operation on the biliary tract are reported. These strictured areas at the first operation have been variously attributed to ulceration by stone or primary ulcerative cholangitis. The purpose of this article is to begin the separation of cases of biliary cirrhosis of undetermined causation.

In all of the 15 reported cases strictures of the hepatic ducts were found within the liver substance or deep in the porta hepatis. In the typical case clinical and laboratory findings strongly suggested obstructive jaundice. If no obstruction is found at surgery, immediate cholangiography is indicated and will frequently show obstruction of one or the other hepatic ducts in the liver substance. All these strictures were found within 3 cm. of the union of the two hepatic ducts. Therefore, the possibility of a congenital site of election is considered. The authors believe that the stenosed areas become incompetent with resulting obstruction when "the density of bile is increased in association with an infectious cholangitis."

The simplest method of treatment consisis of dilatation of the strictured area and insertion of a T-tube to prevent shrinkage. In several patients the stenosed hepatic duct could be anastomosed with the duodenum and a T-tube was left in place from 6 months to 1 year. Other by-passing operations were used in selected cases, such as hepaticocholecystostomy and hepaticogastrostomy. CURTIS ARTZ, M.D.

Surgical Experience of Cholelithiasis. W. F. SUERMONDT. *Arch. chir. Neerl.*, 1951, 3: 3.

The author reports on his surgical experience with 909 patients with gall-bladder disease, from 1925 to 1950 at the Surgical Clinic of the University at Leyden, Netherlands. In the past 5 years, complications following cholecystectomy for cholelithiasis have

been reduced to 8.8 per cent, half of the pre-war figure. The frequency of these complications is doubled and the mortality rate is quadrupled in patients over 50 years of age as compared with those below 50 years. Every one of 62 patients with acute cholecystitis and each of 8 patients with carcinoma of the gall bladder had chronic cholelithiasis. Therefore, the author's original contention that cholecystectomy is indicated in cholelithiasis whenever demonstrated is still valid. He also finds cholecystectomy with careful dissection of the cystic duct to be indicated in chronic cholecystitis without cholelithiasis.

Acute cholecystitis should be treated by early cholecystectomy if the attack has not subsided in 48 hours. If the attack does subside, investigations are made immediately to determine the cause; x-ray evidence of stones or a nonfunctioning gall bladder indicates surgical intervention. If the attack does not subside in 48 hours, cholecystectomy is indicated to prevent gangrene with perforation and peritonitis or pericholecystitis with abscess formation. When the patient is first seen after the third day of the attack, the pericholecystitis is allowed to localize and cholecystectomy is performed after the inflammatory process has subsided. In the case of increasing icterus or symptoms of increasing peritoneal irritation from extension of the process or perforation during this period, cholecystostomy is indicated, followed later by cholecystectomy when the patient is over the acute illness.

The author found that 1 in 6 of the patients with cholelithiasis had common duct stones and that the incidence of common duct stones has decreased to 9.5 per cent, a third of the pre-war value. Exploration and drainage of the common duct quadruples the mortality rate when added to simple cholecystectomy. Therefore, he does not favor exploration of the common bile duct in every gallstone operation. At the Leyden Clinic choledochotomy and choledochal drainage are carried out: (a) if stones can be palpated in the common duct or the gall bladder contains small stones and the cystic duct is wide, (b) if duodenal drainage has indicated infection and the common duct is dilated, thickened, or on puncture reveals cloudy bile, and (c) if icterus is present. Only 0.48 per cent of 619 patients subjected to cholecystectomy but not to choledochotomy later showed stones in the common duct. Cholangiography during surgery and before removal of the drainage tube from the common duct is of great importance in ruling out the presence of a common duct stone. If stones are visible on the postoperative cholangiogram, the author attempts to dissolve them by injecting ether into the tube and gives systemic medication to relax the sphincter of Oddi.

Splanchnicectomy with simultaneous resection of the sympathetic chain of D.VIII to L.II is indicated in cases of true biliary dyskinesia or in cases of postoperative pain not attributable to remaining stones but to stricture of the sympathetic nerve fibers by cicatricial tissue or by the ligature on the stump of the cystic duct. CHARLES C. HENDERSON, M.D.

Trends in Morbidity and Mortality Rates in Biliary Tract Surgery. C. L. PETERSON and I. BOEREMA. *Arch. chir. Neerl.*, 1951, 3: 18.

Two hundred and forty-seven cholecystectomies were performed for biliary tract disease of all degrees of severity from January, 1947 to July, 1949 at the surgical clinic of the University of Amsterdam, Wilhelmina Gasthuis, Netherlands. The authors reviewed the literature and found the average mortality rates for biliary tract surgery to range between 6 and 8 per cent, with a few instances of considerably lower rates established by exceptional surgeons in the past. In the last two decades, a drop in the rate has been apparent throughout the world. Surgical clinics in the Netherlands are peculiarly well adapted for the assessment of the influence of modern surgical advancements since the Dutch clinics were denied the benefit of these advancements until the close of World War II.

Of the 247 patients on whom cholecystectomies were performed, 76 per cent were found to have cholelithiasis. Forty per cent of the patients were subjected to choledochotomy and choledochal drainage and only a third of these were found to have common duct stones. One death occurred, a mortality rate of 0.4 per cent. The morbidity rate was 7.8 per cent, and two-thirds of the complications were due to thrombophlebitis or pulmonary embolism. The complication of postoperative shock did not occur and was eliminated by the routine administration of whole blood transfusions during the operative period. Antibiotics and chemotherapeutic drugs were not used routinely. Acute cholecystitis was treated conservatively.

The authors compare their results with those of Wiersema of the Surgical Clinic of the University of Groningen, Netherlands, published in 1939. He reported a morbidity rate of 12.2 per cent and a mortality rate of 4.8 per cent in 458 cases of biliary tract surgery from 1930 to 1938. All complications except thrombophlebitis and pulmonary embolism were less frequent in the recent series, and the authors suggest that a nutritional factor predisposes to the latter finding.

It may be concluded that the advancements made in modern anesthesia, the use of antibiotics, and improved preoperative and postoperative care have had a marked influence by lowering the morbidity and mortality rates in biliary surgery.

CHARLES C. HENDERSON, M.D.

Acute Pancreatitis and Pancreatic Injuries Following Subtotal Gastrectomy. KENNETH W. WARREN. *Surgery*, 1951, 29: 643.

Acute pancreatitis may follow gastric surgery, particularly gastric resection. Acute pancreatitis is manifested by severe pain in the back and restlessness followed by shock in varying degrees within the first few days following surgery. Jaundice may supervene. Diagnosis is made by the serum amylase test. Nine case reports are presented to illustrate the various types of pancreatic involvement. The

first case was one of acute hemorrhagic, necrotizing pancreatitis following a secondary gastric resection. A duodenal ulcer had penetrated into the head of the pancreas, according to the autopsy findings.

The second case was a local pancreatic necrosis and disseminated fat necrosis with subsequent perforation in the duodenum and common bile duct. These 2 cases were associated with jaundice. The third case was an acute pancreatitis following subtotal gastrectomy for duodenal ulcer which did not appear to involve the pancreas. The fifth case was one in which the patient apparently had pancreatic edema after operation which later progressed to hemorrhagic necrosis. The duodenal stump perforated in this case and it is possible that the pancreatitis preceded the perforation. In the seventh case there was a spontaneous perforation of the duodenal ulcer into the common bile duct and head of the pancreas. In the process of mobilizing the ulcer, the common duct and pancreatic duct of Santorini were severed. Adequate reconstruction was made by uniting the severed ends of the ducts and performing a cholecystojejunostomy. A temporary pancreatic fistula healed spontaneously and recurred 18 months postoperatively. This was an instance of operative injury to the pancreatic duct. In the eighth case the end of the duct of Wirsung had been divided in dissection of the ulcer at surgery. This resulted in a fistula to the abdominal wall. Secondary operation consisted of repairing this fistula by a direct anastomosis to the duodenum over a catheter. In the ninth case a perforated duodenal ulcer had been closed. Nine months later a subtotal gastric resection was performed because of recurrence of the symptoms. Jaundice appeared on the fourth postoperative day, associated with severe pain and localized peritonitis. Spontaneous drainage of the duodenal contents occurred on the tenth postoperative day. A subdiaphragmatic abscess was drained a month later. Two weeks after this a spontaneous bronchopleural fistula developed. Persistent chills and fever with jaundice necessitated another operation 3 months later, at which time the duodenal stump was found to be involved in a mass of fibrous tissue which bound the structure to the anterior abdominal wall. It was found that the common duct and the duct of Wirsung were both blocked by dense scar tissue. The divided duct of Wirsung was anastomosed to the posterior aspect of the duodenum and the severed common duct was anastomosed to the anterosuperior surface of the second portion of the duodenum. This patient made a satisfactory recovery.

Certain technical considerations which might minimize trauma to the pancreatic parenchyma and major ducts during surgery are offered. Mobilization of large penetrating gastric ulcers from the pancreas should be done by blunt dissection, if possible, in order to avoid disruption of the pancreatic parenchyma. The author uses gentle scissors dissection for this purpose. The method of Millbourn is given as an alternative method in which the posterior wall is left attached to the pancreas with removal of the mucosa from the ulcer bed. This should not be applied to gastric carcinomas if they are otherwise operable. In benign ulcers in which the continuity of the posterior wall of the stomach or duodenum is lost and the pancreas forms the base of the ulcer, no attempt should be made to excise, cauterize, or cover the affected portion of the gland.

Protection of the periampullary terminations of the major pancreatic ducts and common bile duct can be accomplished by demonstrating the relationship of the terminal bile duct to the duodenal ulcer, opening the duct, and inserting a long limb of a T tube through the ampulla of Vater. Protection of the duct of Santorini is more difficult because of its location. Millbourn has suggested that this duct can be better protected by doing the duodenal dissection with the stump open.

Aside from direct injury to the pancreatic ducts, which might be observed at the time of operation, it is impossible to predict which patients will develop acute pancreatic necrosis secondary to gastric resection. There appears to be no relationship between the severity of the lesion and the development of pancreatitis. HAROLD LAUFMAN, M.D.

Portography During Operation for Banti's Syndrome (Portographies per-opératories pour syndrome de Banti). PAUL SANTY and PIERRE MARION. *Presse méd.*, 1951, 59: 221.

Since the introduction of portacaval anastomosis into the treatment of portal hypertension, the differential diagnosis of extrahepatic and intrahepatic blocks has assumed great importance. Manual and visual exploration of the hepatic pedicle and the portal system in the course of an operation for portal hypertension may entail great difficulties. In such instances roentgenographic studies during the operation render a valuable service.

In 5 of 15 patients with Banti's syndrome this method demonstrated intrahepatic obstacles and in 10, extrahepatic obstacles.

After ligation of the splenic artery, a rubber catheter is introduced into the splenic vein and 40 c.c. of a 50 per cent solution of diodrast are rapidly injected. A picture is taken toward the end of the diodrast injection and repeated once, 1 or 2 minutes later.

Extrahepatic block which may suggest Banti's syndrome may be caused by an inflammatory congenital stenosis or by thrombosis attributable to chronic pylephlebitis of the portal or the splenic vein. Certain types of portal stenoses are accompanied by cirrhosis of the liver.

Roentgenographic studies should supplement manometric measurements made in the course of the operation. A thrombus originating in the splenic vein and demonstrated in this manner serves as a contraindication to splenorenal anastomosis after splenectomy. Permeability of the portal trunk in splenectomized patients can be demonstrated before a portacaval anastomosis is undertaken.

JOSEPH K. NARAT, M.D.

MISCELLANEOUS

Rational Treatment of Voluminous Hernias and Chronic Eventrations; Preoperative Preparation with Progressive Pneumoperitoneum. Personal Procedure (Tratamiento racional de las hernias y eventraciones crónicas voluminosas; preparacion de los enfermos con neumoperitoneo progresivo. Técnica original). IVÁN GOÑI MORENO. *Prensa méd. argent.*, 1951, 38: 10.

The author summarizes the results of his procedure in 300 patients with large hernias and chronic eventrations, who have been operated upon by him and his co-workers within the past 10 years.

Since the introduction of his method, recurrences were eliminated, and patients with conditions which formerly would have been considered as inoperable, after previous treatment with insufflations, were operated upon successfully and made a quick recovery. Indications for preparation with pneumoperitoneum are the presence of large ventral hernias in patients with tense abdomens and large rings. The chief hazard in these massive hernias is the sudden increase in intra-abdominal pressure caused by replacement of viscera which have been outside the abdomen for a long period of time, and a fatal circulatory failure may result. Preparation with pneumoperitoneum is not required in patients with flaccid abdomen or relatively small rings. In cases of hernia which have been strangulated for several hours, or in the presence of cardiac decompensation, insufflations should not be attempted.

The author stresses the fact that the procedure itself constitutes a useful test of operability and if the correct indications are observed, no accidents will occur. The insufflations act in reproducing on a small scale the postoperative picture, with elevation of the diaphragm and increase of the abdominal pressure. In the first session, 500 to 1,500 c.c. of air are slowly introduced—under continuous control of the intra-abdominal pressures—until the appearance of slight respiratory difficulties, and a diffuse pain which irradiates from the point of puncture toward the entire abdomen. In the following sessions the quantity of insufflated air can usually be increased easily, as the tolerance limit is greater. Patients who do not tolerate 500 c.c. in the first 3 sessions should not be operated upon. The treatment usually takes 3 to 4 weeks, but sometimes longer. At the end of the treatment the spirometric tracings become stabilized and the musculoaponeurotic tension of the abdomen in the two flanks has been reduced. At operation, when the peritoneum is opened and the air released, the abdominal wall remains flaccid and the overlapping of the aponeurosis is possible without tension on the sutures. There is no need of long and deep anesthesia; the intervention can be performed even under local anesthesia.

OLGA M. HARING, M.D.

Treatment of Hemorrhages of the Digestive Tract of Splenoportal Origin (Traitement des hémorragies digestives d'origine spléno-portale). GÉRARD DUFOURMENTEL. *Presse méd.*, 1951, 59: 309.

Portocaval anastomosis is the method of choice in the treatment of hemorrhages of the digestive tract of splenoportal origin. However, this operation is not always indicated. For instance, a hemorrhage may be due to a pure splenopathy, without portal hypertension; furthermore, if an anastomosis is indicated, it may be impossible to perform it. Insufficiency of the liver, poor general condition of the patient, or veins not suitable for anastomosis serve as examples of such a situation. Finally, portocaval anastomosis may give disappointing results; thrombosis of the stoma may annihilate its effect; persistence of irreversible organic lesions created by portal hypertension may be responsible for recurrent hemorrhages in some cases, in spite of a well functioning stoma.

In the presence of one of the aforementioned conditions, the surgeon must resort to other procedures which may be of a palliative nature only but which, nevertheless, may render great service. Compression of esophageal varicosities by a balloon, endoscopic injections of sclerosing solutions into such veins, transverse section of the stomach for the purpose of "azygoportal venous disconnection," ligation of the splenic artery, and omentopexy are such procedures.

The etiology of the condition suggests one of the following procedures:

1. Total gastrectomy. The arguments in favor of this operation are subject to discussion.

2. Splenectomy. This procedure is insufficient for elimination of portal hypertension, and may advantageously be replaced by ligation of the splenic artery. On the other hand, splenectomy is a radical treatment of pure splenopathy.

3. Portocaval anastomosis. This procedure represents the etiologic treatment of portal hypertension in the purest sense of the word.

JOSEPH K. NARAT, M.D.

GYNECOLOGY

UTERUS

Synchronous Combined Abdominovaginal Hysterectomy. JOHN HOWKINS. *Lancet*, Lond., 1951, 260: 872.

The Wertheim operation leaves behind a variable amount of vagina, in which is often found the first evidence of recurrence of the malignancy. Complete removal of the vagina through the pelvis is an extremely difficult technical procedure, and therefore the author describes a synchronous combined abdominovaginal hysterectomy. It is a more radical and thorough procedure than the classical Wertheim hysterectomy, and removes a potential site of recurrence, i.e., the vaginal residuum.

The operation is thoroughly described technically; it is a procedure in which injury to the ureter, bladder, and rectum is much less likely to occur than in other procedures. The operation is a shocking one to the patient and therefore adequate preoperative build-up must be obtained. It is the hope of the author that this more radical procedure will improve the estimated rate of cure obtained by surgery.

ELY ELLIOTT LAZARUS, M.D.

Conservative Treatment of Uterine Myomas (La conducta conservadora en el mioma uterino). CARLOS D. GUERRERO. *Gin. & Obst.*, México, 1951, 6: 43.

The author presents the results of his study of 640 cases of uterine myoma. The findings in these cases serve to emphasize that the method of treatment of patients with uterine myoma should be suited to the conditions encountered in the individual. In the author's opinion, the most important consideration is the avoidance of castration.

In the present series, the treatment varied between the application of hormone therapy, surgical intervention and/or radiation therapy, depending upon the age of the patient and the severity of the clinical course.

As 171 patients were asymptomatic from the beginning and during a 5 year follow-up, they received no treatment at all. Surgery was performed on 292 patients: myomectomy in 233 cases, total hysterectomy in 47 cases, and nonspecific surgical interventions, with conservation of menstruation, in 12. One hundred and seventy-five patients were given medical treatment only, and 2 patients showed improvement following roentgen irradiation.

On the basis of the results obtained, the author regards myomectomy as the operation of choice in patients with bleeding myomas, especially for women who are in the childbearing age, but even in the menopausal or postmenopausal period myomectomy is preferred to hysterectomy, as it is a simpler procedure. In the author's series of 233 myomectomies, only 1 death (due to pulmonary embolism) occurred. There has been no reported case of uterine cancer following myomectomy. It is believed that the only indication for total hysterectomy should be the occurrence of frequent hemorrhages from the uterus in patients over 40 years of age, in whom cancer has been excluded.

OLGA M. HARING, M.D.

Coning Biopsy in the Detection of Early Cancer of the Cervix; A Survey of 500 Normal Women. S. B. GUSBERG. *Am. J. Obst.*, 1951, 61: 276.

The histologic external os, the squamocolumnar junction, is considered the trigger site for most epidermoid carcinomas of the cervix. In the attempt to detect early lesions, cytologic studies have been of great value. However, such studies fail to evaluate the histologic nature or geographic limits of the lesion and biopsy must be performed before therapy is begun.

The author presents a new instrument devised for biopsy of the entire squamocolumnar junction in circumferential fashion without the use of anesthesia, and as an out-patient procedure.

Biopsies with this instrument were performed on 500 women whose uteri offered neither symptoms nor signs of cervical malignancy. The procedure involved only slight discomfort and undue bleeding was rare. There were 10 cases of intraepithelial carcinoma and 10 cases of basal cell hyperplasia.

This method of biopsy is offered as a histologic corollary to cytologic techniques, and as a primary scouting method in the diagnosis of early carcinoma of the cervix.

H. C. FALK, M.D.

Factors Influencing the Prognosis in the Treatment of Carcinoma of the Cervix Uteri. WILLIAM E. COSTOLOW and JAMES F. NOLAN. *Am. J. Obst.*, 1951, 61: 548.

The purpose of this article was to evaluate some of the biological characteristics which may control the destiny of a tumor or influence the prognosis in an individual patient, on the basis of the influence they have exerted upon a group of patients studied by the authors.

A sizeable series of cases is reported (963). The League of Nations classification was used, and the results compared favorably with those of the collected series.

The course of treatment is outlined in detail and the prognosis of the cases evaluated with regard to the various factors involved, namely, radiation dosage, histological grade of the tumor, the growth type, the age of the patient, and the effects of complications.

The results conform to generally accepted clinical impressions and, therefore, tend to confirm the impressions. The authors believe that the stage and volume of the tumor are the two most important factors governing the prognosis. The age of the

patient is perhaps of little importance except that premenopausal women do not seem to fare as well as older ones. The histologic grade of the tumor seemed to have no influence.

The essential factors are uncontrollable except for the stage at which treatment is given.

The authors believe their data shows that the amount of treatment is of prognostic value. Undertreatment becomes important in advanced lesions and overtreatment in early cases; in the latter group increased morbidity due to bladder and rectal injury with over-radiation adversely affects the cure rate. BUFORD F. HESKETT, M.D.

The Uptake of Labelled Phosphorus by Cancer of the Cervix; Preliminary Report. SOMERS H. STURGIS, EDGARD DEMUYLDER, and JOE V. MEIGS. *Ann. Surg.*, 1951, 133: 305.

The purpose of this study was to determine whether or not injections of labelled phosphorus might be of value in solving problems related to cancer of the cervix.

P^{32} was given intravenously and biopsies of the cervix were made 48 hours later. The specimens were minced, dried, and counted with a Geiger-Mueller counter, corrections being made for background and decay. A review of the investigation suggests there is an increase in the total phosphorus concentration in specimens of the cervix showing neoplastic changes, as compared to cervices that have merely inflammatory lesions.

The authors suggest that P^{32} may prove a practical and useful tool in the study of problems related to epidermoid carcinoma of the cervix.

ELY ELLIOTT LAZARUS, M.D.

Individualized Interstitial Irradiation of Cancer of the Uterine Cervix Using Cobalt 60 in Needles Inserted Through a Lucite Template. JOSEPH L. MORTON, ALLAN C. BARNES, GEORGE W. CALLENDINE, JR., and WILLIAM G. MYERS. *Am. J. Roentg.*, 1951, 65: 737.

Interstitial irradiation with good dosage control, with the production of high tumor irradiation and low surrounding tissue irradiation, is well understood, but has not gained many followers in this country. One important reason for this failure of acceptance is the high incidence of complications and unfavorable results. The authors believe this is due to underirradiation or overirradiation resulting from improper physical measurements and freehand implantation of the needles. They have, accordingly, developed a method of inserting guided needles through an individualized applicator, the design of which disperses the irradiation around a line source. The applicators are made of lucite, and the source of the gamma radiation is the isotope cobalt 60. The desired tumor dosage remains somewhat empirical, varying between 6,000 and 10,000 roentgens in a 7 day treatment period.

Irradiation is begun by external therapy to secure irradiation inhibition of the tumor and to clear up infection. Measurements are then taken and the individual lucite applicator is made. The patient is catheterized under anesthesia, the lucite plates are inserted, and the needles are individually placed in the predetermined positions. The patient is again catheterized to check for hematuria.

In the 9 cases treated to date, no serious complications were observed. Tumor regression appears to be taking place but sufficient time has not elapsed to permit an evaluation of the method from a therapeutic standpoint. ELY ELLIOTT LAZARUS, M.D.

End Results of Radiation Treatment of Cancer of the Cervix Uteri. HERBERT E. SCHMITZ. *Am. J. Roentg.*, 1951, 65: 715.

The end results of radiation treatment of carcinoma of the cervix in 188 patients treated primarily were studied. The treatment, well standardized, consisted of radium and x-rays given simultaneously according to the schedules previously reported by Schmitz.

There was a total 5 year survival rate of 43.6 per cent compared to the 28 per cent in a previous series. The improvement was attributed to refinements of technique and the use of an 800 kv. instead of a 200 kv. machine. The complications due to the therapy were neither frequent nor serious. Surgery was restricted to those patients who failed to respond to irradiation therapy. No statistics were given in regard to the frequency of surgical therapy.

JAMES F. DONNELLEY, M.D.

The Possibilities of Radical Surgery in Cancer of the Cervix Uteri Recurring After Radiation Therapy. ALEXANDER BRUNSCHWIG. *Am. J. Roentg.*, 1951, 65: 720.

Cancer of the cervix which recurs after adequate irradiation therapy or which fails to respond to such treatment has a very bad prognosis. To improve it the author has used three surgical approaches, depending on the extent of the lesion. These have varied from a wide excision of the genital tract with dissection of the pelvic lymph nodes to complete exenteration of the pelvic organs.

Although the series is small and the successful results few, some patients are living and well. Such procedures may offer the only hope for these patients and, in addition, may help patients suffering from extensive radiation necrosis and fistula formation.

JAMES F. DONNELLEY, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Seminoma of the Ovary (A propos du séminome de l'ovaire). ANDRÉ RAVINA, GUY SEILLÉ, and ROGER CHEVILLOTTE. *Presse méd.*, 1951, 59: 189.

A tumor of the left ovary, 26 by 20 by 18 cm. in diameter, of rubbery consistency, was removed from a woman 31 years of age. Histologic examination established the diagnosis of seminoma.

As a rule, the correct diagnosis is made only by the pathologist; however, certain features of this rare

type of ovarian neoplasm should bring its presence to the attention of the physician. The tumor is solid, usually unilateral, nodular, relatively voluminous, occurs with greatest frequency in the second or third decade of life, and is observed mostly in women who have some developmental disturbance in their genital apparatus, such as rudimentary uterus, atrophic breasts, pseudohermaphroditism, or true hermaphroditism. An important diagnostic feature of seminoma is the production of gonadotropin.

Ovarian seminoma derives from not yet differentiated embryonal sex cells, and is called dysgerminoma in the Anglosaxon literature.

In France unilateral castration is usually advocated, while in other countries panhysterectomy with bilateral castration is frequently performed. The tumor may be considered malignant if it appears in persons younger than 15 years or past 40 years of age, if it is bilateral, and if it secretes gonadotropin. Radical operation is advisable if the tumor is bilateral and shows signs of invasion of adjoining tissues, or if adenopathies are present. The author is opposed to radiotherapy following conservative excision of the tumor if the patient is of childbearing age. JOSEPH K. NARAT, M.D.

Endometrial Carcinoma Associated With Feminizing Ovarian Tumors. JAMES M. INGRAM, JR., and EMIL NOVAK. *Am. J. Obst.*, 1951, 61: 774.

The relationship of estrogen-producing tumors and carcinoma of the endometrium is stressed by this report. Sixty-six cases of feminizing tumors of the ovary from the authors' laboratory and 50 cases of combined femininizing ovarian mesenchymomas and endometrial cancer reported in the literature were studied. In the authors' own group, 4 combined cases were found. These comprised 12 per cent of the postmenopausal patients with femininizing tumors. This brings the total of recorded cases of combined tumors to 54.

In the 54 cases of combined tumors, the thecoma occurred more often in combination with uterine carcinoma than did the granulosa cell tumor, in spite of the much greater general incidence of the latter tumor. This suggests that the thecoma, by means of greater estrogen production, has the greater carcinogenic effect. It supports the concept that the thecal and not the granulosa cells are the sole or chief source of estrogen. The greatest carcinogenic response to tumor-produced estrogens occurs in the endometrium. Cervical and mammary carcinomas are seen only occasionally in combination with estrogen-producing tumors. The degree of carcinogenic response of these tissues to estrogens in postmenopausal life seems to parallel the degree of physiological response during menstrual life.

A study of 26 case histories, still too few to be conclusive, indicates that although feminizing tumors cause a greatly increased incidence of endometrial carcinoma, they do not seem to incite the appearance of this lesion at an age earlier than is noted in patients with endometrial carcinoma alone. Prolonged estrogen stimulation, rather than temporary intense estrogen stimulation, appears to be necessary for carcinogenesis.

Several observations in these 26 cases support the concept that endometrial hyperplasia is occasionally capable of transforming itself into carcinoma in some predisposed postmenopausal women.

Evidence is presented that in the majority of cases of endometrial carcinoma, hyperestrogenism of varying degree is present. This hyperestrogenism seems to be the one added factor that sets off carcinogenesis in a postmenopausal woman already genetically predisposed to cancer. The cases of combined tumors are thought to represent the most extreme examples of this process. Therefore, they offer an excellent opportunity for the study of the etiological role of estrogens in carcinoma of the endometrium.

Clinical awareness, early preoperative diagnosis, and thorough endocrinological investigation of the combined tumors should throw additional light on this problem in coming years.

JOHN R. WOLFF, M.D.

EXTERNAL GENITALIA

Endometriosis of the Vulva (L'endométriose de la vulve). CL. OLIVIER and PH. BLONDEAU. *Presse méd.*, 1951, 59: 143.

Although less frequently observed than a similar lesion of the perineum, endometriosis of the vulva merits attention. Suspicion of its presence is justified if a subcutaneous nodule in the greater labium increases in size and becomes painful during each menstrual period. This periodicity of evolution is quite characteristic, and permitted the author to establish the correct diagnosis in a woman, aged 33. The only efficient treatment is the excision of the nodule.

The condition may be mistaken for furunculosis of the vulva. It is encountered with the greatest frequency between the ages of 30 and 35 years. The tumor is of hard consistency, has an irregular shape, and is the size of a cherry, or slightly larger. The overlying skin has a normal appearance.

JOSEPH K. NARAT, M.D.

The Construction of an Artificial Vagina, With 10 Year Follow-Up Studies. BUFORD WORD. *South M. J.*, 1951, 44: 375.

The author discusses 9 cases of absence of the vagina in which an artificial vagina was constructed. Seven of the cases were congenital and 2 were traumatic. In 1 of the cases described, the uterus was found to be connected with the artificial vagina and 3 normal children were delivered.

There are two methods in use today for the construction of an artificial vagina. One is the simple construction of a cavity between the bladder and rectum which is kept open with some type of prosthesis to allow the epithelium to grow in and completely line the artificial vagina. The other type of operation utilizes a split-thickness skin graft from

the thigh or abdomen, large enough to line the entire newly created cavity. The skin graft is placed on a mold and inserted in the new vagina.

In all of his cases the author used the simple construction operation. He does not think that there is any advantage to the use of grafts, but believes that the most essential part of the operation is maintaining patency of the cavity after it is created. Any type of vaginal prosthesis that has a smooth surface is satisfactory, and one type of material has no advantage over another.

The author stresses that before the operative repair is undertaken, it is important to make a complete urological study in order to determine the presence of any simultaneous deformity of this tract.

It is not necessary for the vaginal cavity to be completely lined with epithelium for satisfactory sexual relations. The older the patient is at the time of operation the longer it takes for the vaginal cavity to heal completely. ELY ELLIOTT LAZARUS, M.D.

MISCELLANEOUS

Mesonephric Remnants in the Human Female. JOHN W. HUFFMAN. *Q. Bull. Northwest. Univ. M. School.*, 1951, 25: 25.

The mesonephros is a primitive genitourinary organ which undergoes its maximum development and also regression in early fetal life. As a rule, all mesonephric tissues disappear before birth. Occasionally, mesonephric remnants may persist in the pelvic and genital structures of the adult female. They may be found unchanged, presenting their original embryonic features, or they may undergo benign cystic and, very rarely, malignant neoplastic changes. The histological picture determines whether these remnants originate from the mesonephric glomerulus or from the mesonephric duct.

The primitive glomerular bud has the form of a tubule which in its medial end carries a very thin epithelium; its distal portions are lined by large, ciliated and nonciliated, low columnar cells. The ciliated cells have a lightly staining, clear cytoplasm with a large, round nucleus. The nonciliated cells are narrower, their cytoplasm is darker, and the nuclei are ovoid. No definite muscle layer is evident. The mesonephric duct is lined by cuboidal, nonciliated epithelium the cells of which have a pale cytoplasm and a large, centrally placed, vesicular nucleus. The duct has a muscular coat consisting of an inner longitudinal, and an outer circular, layer.

In the embryo and early fetus the mesonephric ducts run parallel with and close to the paramesonephric (mullerian) ducts, first laterally and then crossing over to their medial aspect. While the mullerian ducts continue their development into permanent pelvic genital organs, the mesonephric ducts disappear almost entirely. Their occasional remnants in the adult female retain, however, the original anatomic relationship and will be found on a path which begins in the vicinity of the ovarian hilus, runs parallel and lateral to the fallopian tubes, then penetrates the wall of the corpus uteri, and extends down into the wall of the cervix and finally into the vaginal wall. These remnants are frequently observed above and below the corpus uteri. They have rarely been described within the myometrium because full thickness blocks of myometrium, including the lateral uterine walls, are not examined histologically as a routine measure.

When the mesonephros regresses it shrinks and disappears into the infundibulopelvic ligament and the cephalic portion of the broad ligament. In the adult, only those mesonephric tubules persist which connect with the cranial part of the mesonephric duct. They extend from the lateral aspect of the ovarian hilus toward the uterine tube where they unite with persistent portions of the mesonephric duct. Remnants of the caudal part of the mesonephric duct are always found in the mesosalpinx near the musculature of the uterine tube. Mesonephric remnants within the ovary have never been observed.

Mesonephric remnants in the myometrium originate from the mesonephric duct only. They appear just below the junction of the uterine tube and the uterus, along the lateral margin of the corpus uteri at the outermost edge of the myometrium, and follow a downward and medial course until, at the level of the internal os, they are about equidistant from the outer surface of the uterus and the uterine canal. In the cervix they appear in the middle portion of the lateral cervical wall, forming small tubules or canaliculi, or elongated, narrow clefts. The histological picture corresponds to that described for the mesonephric duct except that the embryonic remnants within the cervical wall have no muscle layer.

Vaginal mesonephric remnants are usually seen in the form of retention cysts.

The following classification which is partly based on that of Gardner, Greene, and Peckham (*Am. J. Obst.*, 1948, 55:917), will be useful in discussing the cystic and neoplastic changes of mesonephric remnants.

1. Vagina. Mesonephric duct cysts.
2. Uterus.
   a. Cervix:
      (1) Mesonephric cysts.
      (2) Mesonephric adenomatous hyperplasia.
      (3) Mesonephric adenocarcinoma.
   b. Corpus: Mesonephric uterine cysts.
3. Broad ligament.
   a. Mesonephric duct cyst:
      (1) Intraligamentous
      (2) Pedunculated
   b. Mesonephric tubule cyst:
      (1) Intraligamentous
      (2) Pedunculated
   c. Paramesonephric cyst:
      (1) Intraligamentous
      (2) Pedunculated
4. Ovary. Mesonephroma (?)
   Hypernephroma (?)

In the vagina, remnants of the mesonephric duct are known as Gartner duct cysts and may be found in the lateral vaginal fornices adjacent to the cervix, just beneath the vaginal epithelium. The cyst wall is lined by low columnar or cuboidal cells.

In the cervix, cystic mesonephric remnants are usually of small size and difficult to differentiate from cysts of the cervical glands. Adenomatous hyperplasia of mesonephric remnants is a microscopic diagnosis which is made when tubules and canaliculi lined by a single layer of low cylindrical, mesonephric-type epithelium are found closely packed within the cervical connective tissue, as a rule in the lateral cervical wall.

Mesonephric adenocarcinoma of the cervix is a rarity. Only about 10 cases have been described in the literature, the first by Robert Meyer. The tumor originates from the lateral cervical wall and is, grossly, friable and grayish-white or brownish in color. It is composed of tightly packed masses of glandular tubules of varying size, showing a disorderly arrangement; papillary extrusions may project into the lumina, or the tubular architecture may be lost entirely. The tubules are lined by cuboidal and low columnar cells, which vary in height and size, and have poorly staining cytoplasm with large, pale, mitotic nuclei.

Mesonephric cysts of the corpus uteri are rare. They lie in the myometrium in the longitudinal axis of the uterus and have a serpentine or corkscrewlike course. They are lined by the typical mesonephric columnar epithelium and may have a thin outer layer of muscle fibers.

Broad ligament cysts may derive not only from the mesonephric duct and tubules, but also from paramesonephric tissue. In each case the epithelium is so distinctive that the origin of the cyst can be accurately identified. Mesonephric cysts have a smooth inner surface without villi or projections. Those originating from the mesonephric duct have a uniform, nonciliated, low columnar epithelium with basement membrane and a thin wall of connective tissue and muscle fibers. Cysts derived from mesonephric tubules are lined by large ciliated and nonciliated, low columnar or cuboidal cells which also have a distinct basement membrane. The cyst wall is thin and contains some muscle tissue. Cysts of paramesonephric origin are lined by epithelium which is responsive to endocrine stimulation, has no basement membrane, and forms projecting villi resembling those of the fallopian tubes.

The pedunculated cysts of the broad ligament are mostly of paramesonephric origin. They are small and translucent, have a long slender pedicle, and may appear near the fimbriated end of the fallopian tube (hydatid of Morgagni) or on the surface of the broad ligament itself (Kobelt cysts). Nonpedunculated and intraligamentous broad ligament cysts originate usually from mesonephric tubules.

The rare mesonephroma of the ovary is usually a malignant, solid or cystic tumor, the microscopic appearance of which suggests the tubular pattern of embryonic glomeruli. The equally rare hypernephroid carcinoma of the ovary has a distinctive bright yellow color and is composed, microscopically, of large cuboidal or polyhedral cells with clear cytoplasm, resembling adrenal tissue. Many investigators doubt the mesonephric origin of either of these tumors, mainly because no benign mesonephric remnants have ever been found within the substance of the ovary.

HERBERT TEICHNER, M.D.

Management of Ureteral Injuries in Pelvic Surgery. ROBERT J. PRENTISS and RALPH B. MULLENIX. *J. Am. M. Ass.*, 1951, 145: 1244.

After briefly reviewing the literature, the authors present their experience with 32 ureteral injuries during the course of pelvic operation. These operations consisted of hysterectomies, abdominoperineal resections, and colon resections. The type of ureteral injuries encountered included ligation, division, excision, displacement angulation, and suture through the ureter. Injuries were recognized at operation in 37.4 per cent of the patients, later in the hospital in 37.4 per cent of the patients, and after the patient left the hospital in 25.2 per cent. The locations of the injuries varied from the intramural regions to portions 15 cm. above the bladder, but they were mainly at or below the pelvic brim.

Sixteen methods of possible ureteral repair are presented, but only 5 of these are recommended. These 5 methods are fully described and include: (1) simple deligation or repair of ureteral incision, with or without indwelling catheter but with extraperitoneal drainage; (2) end-to-end ureteroureteral anastomosis, with splinting, diversion of urine, and extraperitoneal drainage; (3) ureteroneocystostomy, with splinting, extraperitoneal drainage, and possibly diversion; (4) in an emergency and if one is in doubt, extraperitoneal tube-type cutaneous ureterostomy with drainage, and (5) ureterosigmoidostomy. Clear thinking and avoidance of panic are paramount. In most situations the basic materials needed include only No. 8 French urethral catheters or small Dakin tubing, a Penrose drain, and fine catgut on a curved intestinal needle. No operating room is without such basic material.

ELY ELLIOTT LAZARUS, M.D.

A Possible Antipyretic Property of Dicumarol in the Treatment of Septic Pelvic Thrombophlebitis. WARREN A. WOLF. *Am. J. Obst.*, 1951, 61: 573.

During the course of treatment of 4 cases of septic pelvic thrombophlebitis with dicumarol, the author suspected an antipyretic or possibly an antibacterial effect and reported his experiences.

He reviews the usual concepts as obtained from the literature as to the effect of (1) dicumarol in suppressing the production of prothrombin by the liver, and (2) heparin in inhibiting coagulation by inactivating thrombin.

In the series of patients, all were treated with massive doses of sulfonamides in successive courses, and simultaneously with all of the known antibiotics.

This apparently did not affect the fibrile or clinical course until anticoagulants were added, principally dicumarol. The effect was striking in some instances.

Four cases are reviewed in detail, and the author mentions the works of Andres Goth and Minge on the growth-inhibiting effect of dicumarol on bacteria.

BYFORD F. HESKETT, M.D.

The Advantages and Disadvantages of Salpingography, with Particular Reference to the Use of Diodone Viscous. J. H. E. BERGIN. *Brit. J. Radiol.*, 1951, 24: 93.

The question of tubal patency can be determined by insufflation. The question of unilateral and bilateral block or spasm can be determined with variable degrees of accuracy from tracings. The great advantage is the exact and unequivocal evidence of the site and extent of the hold up. This is a valuable asset when the question of operative intervention is being considered. It is also of value in assessing the results of such intervention. In this connection it is interesting to observe the difference in incidence and in degree of isthmal spasm with different media. With lipiodol, over 30 per cent of the patients showed spasm of such severity that no peritoneal spill could be demonstrated, even when glyceryl trinitrite was used, and it was consequently necessary to repeat the examination. No case of spasm of sufficient severity to prevent peritoneal spill has been encountered with viskiosol. Since the present series was completed, 2 cases of spasm have occurred with viskiosol, but in both cases the spasm relaxed after glyceryl trinitrite was administered.

There has long been a controversy as to whether or not retroversion has any marked effect on fertility but no final decision seems to have been reached because of the very large number of factors that contribute to a high or low fertility or to absolute sterility. The present investigation has, however, shown conclusively that retroversion can occlude the os to such an extent as to make it improbable that conception could occur.

The most common cause of impaired fertility in patients with functional pathology is the poorly developed or infantile uterus. Other abnormalities, such as bicornuate uteri, also have to be considered. The actual demonstration of the size and shape of the uterine cavity by two-plane roentgenography provides a much more reliable and exact clinical sign to add to any others in considering the patient as a whole, and it provides an objective method of measuring the effects of endocrine therapy on patients.

To avoid the possibility of intravasation, it is wise to avoid carrying out salpingography for a week before and a week after the period of menstrual bleeding. To reduce apprehension a mild sedative is administered shortly before the examination.

It is desirable to have preliminary films to exclude the presence of opacities likely to cause confusion in interpretation.

A satisfactory method involves the injection of the medium under screen control. After every 2 or 3 c.c., films are taken until there is definite evidence of tubal block or peritoneal spill. The advantage of this method is that the cavity is shown in various stages of filling and distention, and the question of chance filling defects due to air bubbles is eliminated. When using lipiodol it is generally sufficient to use only 5 or 6 c.c. of oil. With viskiosol, however, it is the author's view that at least double this amount is desirable in most cases. Salpingography is now carried out with viskiosol exclusively. As soon as adequate anteroposterior films have been obtained, during which time the cannula should remain in the cervix to prevent vaginal reflux, the instruments are removed from the vagina and the patient is turned on to her side to obtain lateral films to demonstrate the position of the body. The patient is then again turned on to her back and another film is taken after 5 minutes. This film is of value for the following reasons: it demonstrates the presence of delayed peritoneal spill, when this is present; it demonstrates whether the peritoneal spill is "free" or loculated; and it also shows the presence of vaginal reflux, which usually begins as soon as the instruments are withdrawn from the vagina. The absence of such reflux is, as has been shown, strong presumptive evidence of occlusion of the os.

TABLE I.

	No.	Per cent of cases
Examinations	270	
With lipiodol examinations	201	
With viskiosol examinations	69	
Granuloma of tubes found at salpingostomy examinations		14.2
Fibroid examinations		9.5
Infantile uterus examinations		20.0
Tubal block examinations		42.2
Poor technique examinations		25.3

The cases examined by salpingography numbered 270; 201 examinations were carried out with lipiodol and 69 with viskiosol.

In the cases of the patients who were examined with lipiodol in the present series, the incidence of subsequent pregnancy was under 30 per cent. There were, however, other factors contributing to this figure, and therefore it is not regarded as being of great significance. It is also necessary to bear in mind that the converse is true. Among the patients examined with lipiodol a certain number with partially blocked tubes had permanent blockage of the tubes as a direct result of the salpingography. This result did not occur following the use of viskiosol. The patients showing tubal block and in whom no peritoneal spill could be demonstrated after 48 hours when lipiodol was used, and after 5 minutes when viskiosol was used are considered. There were 100 with blockage of the tubes, the frequency of the main types being shown in Table II.

TABLE II.

	Fimbrial blockage 35	Isthmal blockage 65 (Unilateral 24 Bilateral 41)
Subsequent examination carried out on	18	21
Spill seen on second examination	1	18

Table II suggests that isthmal block is, in a high proportion of cases, due to spasm. It is commonly bilateral, and subsequent examination shows the block to have cleared in 85 per cent of the cases without any treatment. The frequency of isthmal block following the use of lipiodol is considerable. Its frequency following the use of viskiosol is very much lower, and in no case has it been of sufficient severity to necessitate repetition of the examination.

In cases of fimbrial block, especially when lipiodol is used, the reverse is the case. It may well be that the increasing use of water soluble media will produce a considerable change in these figures, by decreasing the incidence of both isthmal spasm and fimbrial block. The appearances of both the normal and abnormal vary somewhat according to the medium that is being used. Viskiosol is only half as viscous as lipiodol and, being water soluble, its behavior when in contact with the body fluids is quite different. Moreover, because of its much lower surface tension the appearance of discrete globules, or opacities with clear-cut edges, is much less marked. These findings are particularly obvious in the case of hydrosalpinx. This characteristic is also seen in the cases of peritoneal spill. When lipiodol has been employed, the appearance has been likened to waves on a sandy shore. The oil lies in "ripples" over the peritoneal surface. With viskiosol the appearance is that of a homogeneous "smudge." CHARLES BARON, M.D.

Analysis of Deaths Occurring in 5,318 Gynecologic Operations. J. P. GREENHILL and HAROLD M. LOEFF. *Am. J. Obst.*, 1951, 61: 340.

A study was made of the deaths following surgery on the gynecologic service of the Cook County Hospital, Chicago, for the 5 years from 1943 to 1947 and the results were compared with those published for the same hospital in 1932. During the first 5 year period, 6,022 gynecologic operations, and during the second period 5,318 operations were performed. Two hundred and thirteen deaths occurred during the first period, but there were only 69 in the second, with mortality rates of 3.5 per cent for the first period and 1.3 per cent for the second period.

During the 12 years which elapsed between the two studies, the type of surgery performed underwent considerable change. There was a much greater tendency to remove part or all of the adnexa at the time of hysterectomy, and if it was necessary to remove all of the adnexa, the uterus was also removed. In the recent period the number of total hysterectomies rose from 350 to 1,033. There was a large increase in the number of vaginal hysterectomies, 158 having been performed during the first period and 531 during the second period.

Peritonitis was the most frequent cause of death in both series. It was responsible for 48 per cent of the fatalities in the first period and for 29 per cent in the second period. In 1946 and 1947 only 12.5 per cent of deaths were due to infection and this further improvement was due to the use of penicillin. There were 35 deaths from hemorrhage and shock in the first period and only 13 in the second. The decrease was, in part, due to the development of the blood bank, which permitted more widespread use of transfusions. The death rate from malignancy remained fairly constant, there being 16 deaths in the first period and 14 in the second. There was a marked decrease in deaths from pneumonia and atelectasis, there being 18 fatalities in the first period and only 4 in the second period. The decrease was due primarily to the sulfonamides, penicillin, early ambulation, and the improved technique of anesthesia. There was a marked decline in deaths due to pulmonary embolism, from 18 in the first period to 2 in the second.

The decrease in the number of postoperative deaths in the second study is the result of a combination of factors. Among them were the use of the sulfonamides, penicillin, and streptomycin, better preoperative and postoperative care, improved surgery, the blood bank, and early ambulation.

ELY ELLIOTT LAZARUS, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Characteristic Pigmentation of Scars During Pregnancy (Caratteristico fenomeno pigmentario delle cicatrici durante la gravidanza). U. BOLOGNA. *Clin. ostet. gin.*, 1950, 52: 361.

Scars resulting from operations or accidents which precede pregnancy by at least 1 year do not show any changes during pregnancy and remain pearl-white, glistening, and of the same color, or sometimes even lighter than the adjacent normal skin. Scars which developed only a few months before pregnancy or at the onset, or during pregnancy, will show a deep hyperpigmentation similar to that observed at the nipples and the linea alba. The closer the operation or injury was to the beginning of the pregnancy, the more marked would be the hyperpigmentation of the scar tissue.

These observations were made on 71 pregnant women, 26 of whom had recent scars on various parts of the body, including the abdomen, breasts, neck, and extremities.

The possible mechanism of this phenomenon is briefly discussed, and the role of the melanotropic hormone and vitamins A and C is stressed. The author fails to state, however, whether there was any regression of the hyperpigmentation after pregnancy. HERBERT TEICHNER, M.D.

Chorionic Gonadotropin in the Blood and Urine During Early Pregnancy. REGINALD A. SMITH, A. ALBERT, and LAWRENCE M. RANDALL. *Am. J. Obst.*, 1951, 61: 514.

Since the development and use of biologic tests for pregnancy, there has been a considerable accumulation of unco-ordinated data recording the time of appearance of chorionic gonadotropin in the urine and serum of women after fertilization. The appearance of this hormone has been variously recorded at "a few days after implantation of the ovum" to "two weeks after the expected but missed menstrual period." An investigation was made to establish the time of first appearance of human chorionic gonadotropin in the urine and serum of women after fertilization, as well as to determine quantitatively the concentrations of hormone throughout early pregnancy.

Persons volunteering were husbands and wives from among the professional population of a medical institution. Women from such families, with low incidence of abnormalities in health, were well suited to act as a group from which to derive normal estimations of chorionic gonadotropin during pregnancy. A gynecologic history was obtained; women found to have a regular menstrual cycle were chosen. On the basis of the history or a basal temperature chart, the date of the ensuing ovulation was calculated and intercourse was advised for that particular time.

In each case, 1 week after the calculated time of fertilization, 5 c.c. of blood and a specimen of morning urine were obtained. This was repeated every third day until a positive result of a qualitative test for chorionic gonadotropin was obtained or menstruation ensued. On the appearance of normal menstruation, collection and analysis of specimens ceased and were started again after the anticipated time of ovulation and attempted fertilization in the next menstrual cycle. When a positive result of a qualitative test was obtained from the serum, urine, or both, collection of a 24 hour specimen of urine was immediately begun. A sample of blood was drawn during this interval, and quantitative estimation of the content of chorionic gonadotropin in the blood and urine was carried out. The qualitative tests for the presence of chorionic gonadotropin were carried out on 2 c.c. of urine and 0.1 c.c. and 0.3 c.c. of serum according to the method of Albert, and quantitative assay of the hormone was carried out according to the method of Albert.

Seventeen women were observed through 52 consecutive menstrual cycles. Seven continuing pregnancies and 12 abortions were investigated. Eight of the abortions occurred at or about the time of the first expected menstruation after fertilization, and 4 abortions occurred several weeks beyond this time.

Biologic confirmation of pregnancy has been made in this series, with greatest frequency 5 days prior to the first expected menstrual period after fertilization. By the serial assay of chorionic gonadotropin, a plateau of values of 1,000 to 5,000 I. U. per 24 hour specimen of urine and from 10 to 50 I. U. per cubic centimeter of blood serum was established between the twenty-fourth and the fortieth days after the first day of the last normal menstrual period. Between the fortieth and ninetieth days an elevation of values for excretion is noted, with the peak excretion occurring on the seventieth day in both the urine and the blood serum. After the ninetieth day values for chorionic gonadotropin in the urine ranged between 2,000 and 15,000 I. U. per 24 hour specimen and between 10 and 100 I. U. per cubic centimeter of serum. The establishment of normal values in early pregnancy has been of aid in the prediction of abortion and the fixation of the duration of pregnancy. In this study the rate of early abortion was high.

Gestation and Delivery After Conservative Surgery of the Uteroadnexal Apparatus (Grossesses et accouchements après chirurgie conservatrice de l'appareil utero-annexiel). P. LAFARGUE and G. FAUGERE. *J. méd. Bordeaux*, 1951, 128: 212.

The choice of surgical procedures in gynecology should be dominated by modern concepts of endocrinology and physiologic histology, with the purpose of preservation of the individual and propagation of the species.

The authors advocate myomectomy in preference to hysterectomy even in the presence of multiple, or large, or necrobiotic tumors. Myomectomy should be done in the presence of a unilateral inflammation of the adnexa, while a bilateral process calls for hysterectomy. Phlebitis and embolism are not more frequent after myomectomy than after hysterectomy. Since the introduction of antibiotics, exposure of the uterine cavity is no longer feared. Recurrences are relatively frequent but, as a rule, do not interfere with gestation.

The authors are opposed to hysterectomy performed to facilitate salpingectomy. Infected tubes should be removed in the direction from the uterus toward the ovary. Hydrosalpinx and hematosalpinx indicate salpingotomy in the region of the ostium. Resection of the involved segment with reimplantation of the tube into the uterine cavity produced, in properly selected cases, better results than salpingotomy.

Inflammatory processes involving the superficial layer of the ovaries may be treated in a conservative manner with special attention to preservation of the blood and nerve supply to the involved organ.

Spontaneous interruption of pregnancy in a bicornate uterus occurs frequently, but the chances of a full term gestation increase with the number of pregnancies, due to morphologic and functional adjustments of the uterine wall.

Amputation of the cervix for chronic cervicitis must be condemned because it produces fibrous rings, deformities of the cervix, and sclerotic changes. Electrocoagulation should replace such mutilating procedures.

Myomectomy for torsion of a myoma or for a tumor wedged into the pelvic cavity is rarely followed by abortion.

The authors are ardent supporters of conservative surgery in cases of low insertion of the placenta, uteroplacental apoplexy, or rupture of the uterus intrapartum. JOSEPH K. NARAT, M.D.

A Case of Fibroma of the Ovary, Ascites, and Hydrothorax (Meigs' Syndrome) Associated with Pregnancy (Fibroma de ovario, ascitis e hidrotórax (síndrome de Meigs) y embarazo). JULIO MANUEL MORALES and O. GÓMEZ NÚÑEZ. *Obst. gin. lat. amer.*, 1950, 8: 531.

The authors describe a case of Meigs' syndrome in a 29 year old quintipara who was hospitalized because of difficult breathing and marked increase in the size of the abdomen. Her periods were always regular, 28 x 7, although the last two menstruations were less profuse than usual.

Examination revealed the presence of a pelvic tumor, ascites, and right hydrothorax. Through paracentesis and thoracentesis, 2,000 c.c. and 600 c.c. of yellowish fluid, respectively, were obtained. At laparatomy, 2 weeks later, there were about 5,000 c.c. of lemon-colored fluid. A firm tumor of the right ovary, measuring 14 by 8 cm., and weighing 1.150 gm. was removed. The uterus was enlarged because of the presence of a 10 weeks' pregnancy, which was terminated by hysterotomy.

On histologic examination, the tumor appeared to be a fibroma of the ovary. The patient recovered uneventfully. Three months following the operation there was no recurrence of ascites or hydrothorax.

HERBERT TEICHNER, M.D.

Early and Late Results in the Interruption of Pregnancy (Des résultats immédiats et éloignés de l'interruption de la grossesse). FOLKE HOLTZ. *Rev. fr. gyn. obst.*, 1950, 45: 277.

The author reports his experiences with the interruption of pregnancy on medical indication, in a series of 500 cases at Stockholm, Sweden.

The Swedish law permits a wider range of medical indications for the interruption of pregnancy than is usual in other countries. The purpose of this more generous interpretation of "medical indication" is to discourage illegal abortions, and so to protect the health of pregnant women; however, the author states that also in interruptions done by physicians in hospitals, the number of infections and other complications after therapeutic abortion is much too high. He believes that this is due to unsuitable and outdated techniques, especially dilatation by laminaria bougies, packing of the uterus, and paracentesis of the ovum. Statistics published by one of the largest Swedish hospitals showed that fever developed in 21.9 per cent of patients treated with laminaria bougies, and in no less than 66.3 per cent of those in which the uterus was packed.

The author performs all interruptions by vaginal hysterotomy with the exception of early cases (second month), in which he extracts the ovum after dilatation with Hegar bougies. He gives a detailed description of his technique of hysterotomy. A horizontal incision of 3 to 4 cm. length is made in the anterior wall of the vagina close to the cervix, and the cervix is separated from the posterior wall of the bladder. After the anterior wall of the cervix is exposed, a long forceps is introduced in the external orifice and pushed upward beyond the internal os; then an incision of 2 cm. length is made in the cervix, deep enough so that the scalpel comes in contact with the forceps. The incision is then continued upward with scissors, and the uterus is evacuated. Large fetuses are extracted after podalic version, and the following head is perforated. The intervention can be performed in 10 to 15 minutes.

With this technique, the author had excellent early and late results. Only 8 of the 500 patients had postoperative complications (urinary fistulas, salpingitis, or fever). All of them recovered completely. The average duration of bed rest was 4 to 5 days.

As to late results, a number of different disturbances have been ascribed to therapeutic abortion: irregular menstruation, diminished fertility, sterility, pains, frigidity, etc. The author was able to follow up 462 of the 500 cases and did not observe any late disturbances that could be attributed to the interruption.

He concludes that, given well founded indications and correct technique, therapeutic interruption involves a minimum of risk and, in the overwhelming majority, results in rapid recovery or marked improvement of the patient's health.

WERNER M. SOLMITZ, M.D.

Influence of the Death of the Fetus on the Inulin Permeability of the Ovular Membranes; a Hitherto Unpublished Chemical Test for the Diagnosis of Intrauterine Fetal Death (Influence de la mort du foetus sur la perméabilité des membranes ovulaires à l'inuline. Test chemique inédit pour le diagnostic de l' "exitus foetal in utero"). PIERRE ROSA. *Bruxelles méd.*, 1951, 31: 310.

Urine and amniotic fluid are collected from the fasting patient. Five grams of inulin are then injected into the amniotic cavity. An hour later some amniotic fluid is again removed. From the still fasting patient, 11 hours later, urine and amniotic fluid are collected anew. The specific gravities of the urinary samples are brought to the same specific gravity by the addition of distilled water to the more concentrated fluid. The inulin is now estimated in the 5 aliquots (2 samples of urine and 3 of amniotic fluid).

The inulin values of these samples are determined by the method described by Shannon, based on the blue violet coloration assumed by the inulin solution, when heated, in the presence of diphenylamine in concentrated hydrochloric acid. The colorimetric determination is then realized on a Hilger photometer.

Three cases of death of the fetus in utero have been subjected to study with the use of this method. In the first instance the fetus was known to have died 24 hours previously. There was no evidence of such lowering of the inulin value in the amniotic fluid as would suggest its being swallowed and stored in the body of the fetus. There was also no evidence that the ovular membranes had as yet become permeable to the carbohydrate.

In the second instance the death of the fetus was estimated to have occurred 4 or 5 days previously. There were amounts of inulin in the urine and blood of the mother which were too high to permit of any other assumption than that the substance had been eliminated into the mother's blood stream from the intraovular depot. The loss of inulin from the amniotic fluid itself suggested such an eventuality.

The third fetus was estimated—by means of its condition when born—to have died about 3 weeks previously. In this case there had occurred a massive elimination of the inulin from the amniotic fluid, and the urine of the mother contained the substance in such concentration as to render its estimation difficult.

The author admits that the test is not free from serious error and that too long a time is required for its consummation. For this reason it would not be of much practical value for the fetus in agony; nevertheless it seems obvious that the very finding of a substance which shows up rapidly in the mother's urine and which is easily determined by chemical methods is a step in the right direction. The diagnosis of intrauterine death of the child has always been a moot question, and none of the methods so far proposed seem to promise that objectivity which would prevent embarrassing mistakes, even in the hands of the most skillful and experienced obstetricians. It is so hard to be sure, in making the diagnosis of intrauterine death; there has been a tendency to delay action until positivity can be obtained and this tendency is the very factor which may work to the disadvantage of the suffering unborn child.

The present study would seem to have clarified to some degree our conceptions of the *modus operandi* in the production and circulation of the amniotic fluid, and of the conditions of permeability of the ovular membranes preceding and following death in utero of the fetus. JOHN W. BRENNAN, M.D.

The Dangerous Placenta. JOHN STALLWORTHY. *Am. J. Obst.*, 1951, 61: 720.

In cases of placenta previa, the ideal for which we strive is no maternal deaths and a fetal wastage of less than 10 per cent. This can be obtained by teamwork starting in the antenatal clinics and involving the obstetricians, the radiologists, the pediatricians, and, last but not least, the nursing staff.

The radiologist is of particular value in helping to select the patients suitable for expectant treatment, and in avoiding the unnecessary hospitalization of patients without a placenta previa. When a skilled staff is not available for soft tissue placentography, a simple lateral film of the pelvis can be of use.

Anemia must be detected early and treated adequately, and from then on the watchword is "Avoid hemorrhage." Expectant treatment is possible in more than 80 per cent of the cases and should reduce the fetal mortality to the level of 10 per cent or less. This treatment when carefully supervised also improves the maternal prognosis.

The more cases of placenta previa detected in the antenatal clinic before hemorrhage occurs, the better will be the results for the mother and infant. In any large series it should be possible to admit to the hospital at least 20 per cent of the women with placenta previa before there is any hemorrhage.

Cesarean section has an important place in the modern treatment of the condition, but only a place. It is the method of choice in approximately 50 per cent of the cases. The selection of these depends on the relation of the presenting part to the brim of the pelvis, more than on the position of the placenta in relation to the cervix. When the presenting part will not engage, rupture of the membranes may lead to disaster for both the mother and infant.

The dangerous placenta is not the total one or the Type 4, as is commonly taught, for concerning the treatment of this there is little dispute. Greater danger lurks in the low lying Type 1 or

Type 2 placenta when it is posteriorly situated. Although so little of the placenta may be in the zone of dilatation as to be out of reach of all but the most experienced fingers, it may prevent engagement of the presenting part and by so doing render difficult or impossible the adequate control of bleeding by the vaginal route. With this type of placenta there is an increased hazard of cord compression. It can be diagnosed in time to save the fetus and is an indication for cesarean section.

JOHN R. WOLFF, M.D.

Discussion on New Ideas About the Diagnosis and Treatment of Placenta Previa. JOHN STALLWORTHY, C. H. G. MACAFEE, C. MCINTOSH MARSHALL, W. G. MILLS, and OTHERS. *Proc. R. Soc. M.*, Lond., 1951, 44: 121.

JOHN STALLWORTHY stressed the problems peculiar to posterior placenta previa, the so-called "dangerous placenta." The hazard of this type of placenta lies in the fact that the placental tissue is usually out of reach of all but the most experienced examining finger but still may prevent engagement of the presenting part and thereby render difficult or impossible the control of bleeding from pressure of the fetal head. There is also an increased hazard of cord compression should the cord originate low on the placenta. Anterior displacement of the presenting part is a clinical and roentgenologic sign of a posterior placenta previa, this being caused by the placenta's lying over the sacral promontory and reducing the effective conjugate. The relation of the placenta to the internal os is not as important as the relation of the presenting part to the brim of the pelvis. Consequently, if the head can be made to enter the pelvis without disturbance of the fetal heart rate, rupture of the membranes is indicated; otherwise, cesarean section should be done. Among 250 cases of placenta previa managed in Stallworthy's institution there was 1 maternal death (nonobstetrical) and an uncorrected fetal wastage (stillbirths and neonatal deaths) of 18 per cent. Section was performed in 40 per cent of the series, and in 87 per cent of these lower segment operations were done.

C. H. G. MACAFEE believes that the radiologist can furnish only contributory help in diagnosis and suggested therapy. Vaginal examination is not always necessary or prudent, since abdominal and roentgenologic investigations are at times sufficient for accurate diagnosis. If excessive bleeding is produced by vaginal examination then the examination has been too vigorous, but certainly no vaginal examination should be done except under the best possible circumstances. Macafee reported on 108 patients with placenta previa of whom 53.7 per cent were delivered by cesarean section. Fetal wastage was 10.9 per cent.

C. MCINTOSH MARSHALL reported 306 cases with 1 maternal death (ruptured uterus following internal podalic version) and a total fetal mortality of 18 per cent. His present principles of therapy are as follows:

1. There are three courses of therapy: normal vaginal delivery, artificial rupture of the membranes, and lower segment cesarean section. The condition of the child is not considered in deciding on the management to be pursued.

2. When the patient is near term with bleeding cesarean section is proper.

3. When the patient is in labor and is bleeding, vaginal examination is usually done unless the history and abdominal signs strongly suggest placenta previa.

4. In the presence of prematurity with bleeding and bleeding subsides, expectant treatment is proper.

5. Expectant treatment is ended when labor intervenes, when the fetus reaches the period of viability without bleeding, or if repeated bleedings occur. In each instance one should then decide on the course to follow.

W. G. MILLS commented on various reasons why the fetal and neonatal mortalities have not been reduced:

1. Too many patients are being examined after vaginal examination in the home. This leads to either onset of premature labor or persistent hemorrhage.

2. Patients are admitted with severe hemorrhage with a history of repeated previous "small bleedings" which have been ignored.

3. There is some association between placenta previa and pre-eclamptic toxemia.

4. Some of the infants born by cesarean section are premature and their condition is extremely poor.

LINTON SMITH favored conservative treatment of placenta previa especially if the infant is premature. In general, vaginal examination is best avoided.

J. CHASSR MOIR reported two series of 150 cases each. In the first series nonconservative therapy was utilized with a total fetal loss of 37 per cent. When conservative measures were followed the fetal loss was only 21 per cent. Moir says that more than the soft tissue technique is needed for the roentgenologic diagnosis of placenta previa. One must also study any displacement of the fetal head from the sacral promontory or pubis, and note also the degree to which the fetal head falls toward the uterine wall in various desired directions.

WARREN R. LANG, M.D.

LABOR AND ITS COMPLICATIONS

Influence of Analgesics on Pain Intensity During Labor, with a Note on "Natural Childbirth." CARL T. JAVERT and JAMES D. HARDY. *Anesthesiology*, 1951, 12: 189.

The authors studied the effects of various analgesic agents on the pain intensity of normal patients in the first stage of labor. The Hardy-Wolff-Goodell dolorimeter was used for this purpose. This apparatus produces a three-second thermal stimulus on the skin.

Pain intensity was measured by asking the patient to compare the greatest intensity of pain dur-

ing the uterine contraction with that applied to the skin between the contractions. Measurements were made of pain threshold and pain intensity as expressed in "dols" (a dol is equivalent to a pain equal to one-tenth of the greatest painfulness). Twenty-six patients were studied before analgesia; 19 were given 26 injections of various analgesics.

All the obstetrical patients before or during labor had a constant skin pain threshold. There was no change in the threshold during labor—contrary to the usually accepted notions.

The effects of the agents used were variable in causing: (1) lengthening of the uterine contraction interval, (2) shortening the duration of the contractions, (3) accelerating cervical dilatation, (4) reduction in pain intensity and raising the skin threshold, and (5) relaxation, drowsiness, and amnesia. Without analgesia, pain in labor reached 10 to 10½ dols, which is a ceiling pain.

Moderate doses of analgesics reduced pain in the first stage (from 6 or 8 dols to 2 or 3 dols) without changing the level of pain threshold. Large doses of morphine and scopolamine in combination, and heroin raised the skin pain threshold, thus enabling true analgesia.

Five patients having natural childbirth experienced pain intensity similar to those receiving no analgesia. WARREN R. LANG, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Acute Miliary Tuberculosis in Pregnancy and the Puerperium Treated with Streptomycin (Tubercolosi acuta miliare in gravidanza e puerperio e suo trattamento streptomicinico). ALESSANDRO PROVENZAL. *Riv. ital. gin.*, 1951, 34: 126.

Miliary spread of tuberculosis associated with pregnancy occurs rather infrequently. In 1948, Lundstrom (*Acta Obst. Gyn. Scand.*, 1948, 27:84) was able to collect only 72 cases from the literature. Miliary tuberculosis is rarely seen in the first half of pregnancy; it is observed more often in the late part of pregnancy; commonly, however, it follows either delivery or abortion. The disease was of extragenital, and mostly pulmonary, origin in about 70 per cent of the cases, while in about 30 per cent, a primary genital focus was observed. Nearly all of the patients died within a short time after termination of the pregnancy. Very often the miliary spread was preceded by intrauterine procedures for removal of retained secundines. It is quite possible that the specific endometrial lesions are directly responsible for the incomplete separation of placenta and membranes.

The clinical picture of acute miliary dissemination of tuberculosis has a violent onset with intense chills and persistent high temperature; the general condition of the patient becomes rapidly poor. At first there is no evidence of localization; in a later stage, peritoneal spread prevails in puerperal patients, while the meningoencephalitic form is more common during pregnancy.

The author reports 5 cases of diffuse miliary tuberculosis which were observed in the Obstetrical Clinic of the University of Florence (Italy). Three of the patients, who were treated with streptomycin, recovered.

The first patient had bilateral pleuritis with minimal parenchymal involvement at the apex about 2 years previously. At the beginning of the present pregnancy the proposal of a therapeutic abortion was not accepted by the patient. In the seventh month she had an ulcerative caseous lesion in the right apex and bilateral miliary dissemination, followed, a few days later, by diffuse bladder involvement. Spontaneous delivery of a living infant, weighing 2.100 gm., occurred 1 month later. The patient died on the thirty-second postpartum day and autopsy confirmed the diffuse miliary dissemination in the lungs, liver, kidney, and urinary bladder. The infant, who after birth showed no clinical or radiological evidence of tuberculous infection, died 3 months later of capillary bronchitis.

In the second patient, a persistent laryngitis in the sixth month of pregnancy prompted her physician to take chest x-rays, which were negative. In the eighth month, there was a sudden onset of tuberculous meningitis, pleuritis, and laryngitis. Shortly later the patient died undelivered.

The third patient was admitted in her eighth month with a diagnosis of diffuse miliary pulmonary and laryngeal tuberculosis. After unsuccessful attempts to induce pneumothorax, the patient was started on 1.0 gm. of streptomycin and 20 tablets of para-amino-salicylic acid daily. Within 30 days the chest x-rays showed almost complete disappearance of the miliary foci and the sputum had become negative. A few days before term the patient had a spontaneous delivery of a living infant, weighing 2.600 gm., who showed no evidence of tuberculous infection. No gross lesions were noted in the placenta. Follow-up of the patient resulted in negative sputum examination and negative guinea pig inoculation of the urinary sediment.

The fourth patient had a premature home delivery in the seventh month. Because her father had died of pulmonary tuberculosis, a chest x-ray was taken in the sixth month, and reported normal. A few hours after delivery she developed chills and high fever. Because of profuse bleeding, her physician explored the uterine cavity on the fourth day for retained secundines. Her condition became much worse and on the eighth day she was admitted to the hospital where bilateral miliary pulmonary tuberculosis was diagnosed. She was started on streptomycin, 0.5 gm. daily, and 15 tablets of para-amino-salicylic acid, and later on was transferred to a sanitarium. Within 7 months there was almost complete disappearance of the miliary lesions.

The fifth patient had a difficult forceps delivery with manual removal of the placenta, followed by a septic course of about 2 months. A hemorrhage necessitated an uterine curettage which, on histologic examination, revealed the presence of tuberculous

endometritis. Chest x-ray films showed the presence of bilateral diffuse miliary pulmonary tuberculosis. After unsuccessful attempts at pneumothorax she was started on streptomycin, 1.0 gm. daily, and improved promptly. A few days later there was evidence of tuberculous pelvic peritonitis and parametritis. Two months following the first appearance of the pelvic peritonitis the patient was finally hospitalized. A large amount of pus was evacuated through a colpotomy and the abscess cavity was infiltrated with streptomycin and penicillin. The patient recovered rapidly and was able to be discharged after 26 days.

These 5 cases represent a very small number among the tuberculous pregnant women who come to that hospital either for treatment or for therapeutic abortion (no statistical figures are given). The author feels that the condition of women with known tuberculosis will not become worse during pregnancy and the puerperium because of the active treatment which is given in such cases. The greatest danger exists for these pregnant women who have a nondiagnosed specific focus, particularly if obstetrical complications occur. The author believes that the presence of tuberculosis does not warrant therapeutic abortion in view of the successful treatment which streptomycin affords even in the severest miliary forms, as illustrated by the 3 cases which have been described. HERBERT TEICHNER, M.D.

Spontaneous Subarachnoid Hemorrhage During the Puerperium. Study of a Clinical Case (Sulla emorragia sotto-aracnoidea spontanea nello stato puerperale. Studio di un caso clinico). TULLIO SUTTORA. *Minerva gin.*, Tor., 1950, 2: 552.

A 42 year old country woman had never had any serious sickness and had had 3 normal deliveries and an interrupted pregnancy in the third month. The present pregnancy had been perfectly normal and on examination nothing pathological could be found.

Twenty hours after the entirely physiological and not too prolonged labor, with birth of a healthy female child weighing 3,700 gm., the mother complained of headaches of increasing severity and showed some painful stiffness of the neck muscles. Later there appeared Kernig's sign, photophobia, somnolence, increased reflexes, especially on the left side, and a temperature of 39° C.

Spinal puncture produced spinal fluid under moderately increased pressure which was strongly and uniformly hematic. The blood platelets numbered 210,000 per cubic millimeter; tourniquet and hammer tests were negative; coagulation time was 5 minutes, and bleeding time 4 minutes. On the seventh postpartum day there was a moderate degree of turgidity of the retinal vessels, particularly of the arteries, and the edges of the disc appeared to be cloudy. From the seventh day on, however, the patient began to get better and she was discharged, perfectly well, on the twenty-seventh postpartum day. During the entire period, of course, she was given penicillin, hypertonic saline solution, and vitamins C, P_2, and K.

A study of the literature indicates a marked discrepancy between the neurologic and the obstetric cases with reference to spontaneous subarachnoid hemorrhage, which leads to the conviction that these cases are being missed by the obstetrician.

It is believed that the case here reported was an instance of primary subarachnoid hemorrhage, that is, that the bleeding did not originally occur within the brain substance and later burst through into the subarachnoid spaces by way, perhaps, of the ventricles. If the latter eventuality (secondary subarachnoid hemorrhage) had occurred the patient would not have recovered so promptly or fully, there would likely be complete loss of consciousness (coma) and some paralysis, and the patient would be more apt to be both arteriosclerotic and hypertensive.

The treatment is both prophylactic and curative. The pregnant patient suspected of having, or having been proved angiographically to have angioma or aneurysm of the cerebral vessels, should be subjected to abortion (De Carle: *West J. Surg.*, 1949, May) or, if the fetus is carried to term, delivery should be made by cesarean section, the patient receiving vitamins C, P_2, and K in the meantime.

When the cause of hemorrhage is established the vitamins should, of course, be continued and hypertonic glucose should be administered. The question of repeated spinal puncture for purposes of depletion is an open one. In view of the mild character of the symptoms of the patient whose case was here reported, this was not considered necessary.

JOHN W. BRENNAN, M.D.

NEWBORN

Resuscitation of the Newborn. JOHN P. FLETCHER and JOSLYN W. ROGERS. *J. Am. M. Ass.*, 1951, 145: 533.

Hypoxia occurs in every newborn infant during or immediately after birth. Asphyxia develops if the infant fails in his initial respiratory efforts, the ensuing oxygen want causing depression of the respiratory center. The respiratory depression aggravates the oxygen lack, setting up a vicious cycle that leads to death if not checked.

Hypoxia in the newborn is usually of the anoxic type, due to obstruction of the air passages or to depression of the respiratory center. A stagnant type of anoxia results when the circulation fails, while the anemic type of anoxia is present in severe erythroblastosis. There is evidence that severe hypoxia for 5 minutes may produce permanent damage to the cerebral cortex and small pyramidal cells, while the cells of the medulla may withstand hypoxia for 20 to 30 minutes. Thus, it is likely that epilepsy or mental deficiency may occur in infants surviving severe birth asphyxia.

Secondary to anoxia is the acidosis from the accumulation of carbon dioxide and lactic acid. The ad-

ministration of carbon dioxide to newborn infants is to be avoided because it further lowers the *p*H of the blood.

The outstanding pathological lesion of hypoxia is pulmonary atelectasis which is due to failure of the respiratory process. Any factor causing hypoxia which results in incompletely expanded lungs will produce atelectasis of the lung. Secondary to this, there is vascular dilatation, congestion, edema, and multiple hemorrhages into all of the organs. It is not possible nor safe to expand atelectatic alveoli by any gas under pressure.

If strong respiratory movements occur just before the head is born, the lungs may partly expand and result in aspiration of the amniotic fluid, meconium, or blood into the trachea and bronchial tree. The degree of narcotic depression of the infant is important in explaining the mechanism of aspiration of obstructing material. If the infant is only slightly narcotized, he will respond with laryngeal spasm when the foreign material comes in contact with the epiglottis. He will show symptoms of hypoxia after birth, but simple removal of the obstruction from his larynx will result in normal respiration. If he is moderately narcotized by sedation and anesthesia, the laryngeal reflex may fail to operate and considerable amounts of the thick fluid may enter the trachea to be gradually sucked down. The deeply narcotized infant will make no respiratory effort for many minutes after birth and therefore will not aspirate during delivery. As a rule, no obstructing material will be found in his airway and oxygen administration will relieve his hypoxia.

Treatment of neonatal hypoxia and asphyxia should be firstly prophylactic by good obstetric technique. This includes minimal sedation and anesthesia, administration of oxygen to the mother in the presence or anticipation of fetal distress, and use of low forceps and episiotomy to protect the infant's head from pressure on the perineum. Following delivery, the treatment is directed toward prompt removal of any obstruction from the air passages and administration of oxygen to the infant.

For this purpose a simple device is used; it causes a minimum amount of trauma and consists of a McGill catheter with a side arm for oxygen delivery. A metal blow-off valve on the oxygen delivery line prevents the oxygen pressures exceeding 2.5 cm. of water pressure. Obstructing material is removed by inserting a smaller plastic suction tube into the lumen of the McGill catheter, which is introduced under direct vision by means of an infant-sized laryngoscope.

Clearing of the supraglottic region is often sufficient to establish adequate respiration. If necessary, the McGill catheter is advanced through the glottis and the plastic suction tube is withdrawn after all the obstructing material has been aspirated. By closing the open end of the McGill catheter with the thumb, oxygen is administered intratracheally. If respiratory movements become vigorous, the thumb is lifted from the open end during expiration. When the infant's color and tone are satisfactory the McGill catheter may be withdrawn from the trachea. HERBERT TEICHNER, M.D.

MISCELLANEOUS

Wider Indications for Cesarean Section (Die erweiterte Indikationsstellung zur Sectio caesarea). E. ANDERES. *Geburtsh. & Frauenh.*, 1951, 11: 1.

In a lecture given at the Rheinisch Society for Obstetrics and Gynecology at Heidelberg, Germany, the author reviews the current indications and contraindications for cesarean section.

Statistics from obstetrical hospitals in different countries (Switzerland, Germany, Belgium, and the United States) show that the mortality of the intervention has decreased considerably during the last 15 years and it is now well below 1 per cent. Of the different methods, the transperitoneal cervical section has the lowest mortality. Quoting the American obstetrician, Beck, the author states that the mortality should never exceed 1 per cent if the right operation is performed at the right time, and on the right patient.

In cases of infection, and possible infection, the operation should be avoided, if feasible; the mortality in these cases varies from 4 to 14.8 per cent.

Cesarean section is much less dangerous for mother and child than high forceps, which should be discarded altogether.

The most important factor is the time for intervention. "Watchful expectancy," which is still taught in many obstetrical schools, is a very risky procedure. The decision for or against section should be made at the earliest possible time. The author considers continuous control of the white blood count as the most valuable criterion for the prognosis. He presents interesting graphs to show that increase of the leucocyte count to more than 20,000 and increase of the staff cells to more than 15 per cent are serious signs indicating that the choice between abdominal and vaginal delivery cannot be postponed any longer without grave risks. The count should be repeated several times daily.

WERNER M. SOLMITZ, M.D.

Pathologic Anatomy and Symptomatology of the So-Called Destructive Hydatid Mole (Zur pathologischen Anatomie und Klinik der sogenannten destruierenden Blasenmole). HERBERT CRAMER. *Geburtsh. & Frauenh.*, 1951, 11: 65.

The author reports the case of a 34 year old woman who was admitted to the hospital with symptoms of threatened abortion. As bleeding persisted for several days, evacuation of the uterus was attempted. No fetus was found, and typical mole vesicles were evacuated. Manual exploration revealed that the mole had invaded the uterine wall close to the cervix. Severe hemorrhage necessitated immediate laparotomy and hysterectomy.

Histologic examination of the extirpated uterus showed that at the border between the cervix and

corpus the decidua was necrotic or entirely missing. The villi had invaded the uterine veins in this area. A large proportion of the veins were extremely dilated and filled with villi. Small complexes of chorion cells and vesiculous villi had almost reached the peritoneum inside of the veins.

Destructive hydatid mole is extremely rare; only about 30 cases have been reported in the entire literature. It is difficult to decide under what pathologic group it should be classified, as it is a borderline case between pathologic increase of normal growth processes and true tumor. However, histologically it does not have the characteristics of malignancy because the villi proliferate only in preformed tracks, namely, the uterine veins. No case is on record in which whole villi perforated the venous walls and invaded the muscle, although single cells of chorion epithelium may be found in the venous wall or in the tissue surrounding the veins. There is a definite difference between hydatid mole with intravenous proliferation of villi and chorionepithelioma. For this reason the term "destructive hydatid mole" should be avoided as misleading.

Although benign from the pathologicoanatomic point of view, the condition is extremely dangerous clinically. The dangers are: (1) perforation of the uterus in the attempt at evacuation, (2) infection and septicemia, (3) sudden profuse hemorrhage. Hemorrhage is the most frequent cause of a fatal outcome. Only immediate hysterectomy can save the patient once the dilated veins, filled with vesicles, are opened. The author could find only 2 cases in the literature in which the patient survived the profuse hemorrhage.

WERNER M. SOLMITZ, M.D.

Technique of Obstetrical Analgesia (Zur Technik der geburtshilflichen Schmerzbekaempfung). O. KAESER. *Geburtsh. & Frauenh.*, 1951, 11: 97.

An ideal analgesic should be harmless for the mother and the newborn; it should not affect the consciousness of the patient as it is essential for her active co-operation; it should not delay the parturition or intensify the postpartum bleeding; and its employment should be technically simple. None of the known analgesics fulfill all of these requirements.

Labor pains may be alleviated by:

1. Spasmolytic drugs (such as belladonna, papaverine or spasmalgin) or psychotherapy. Such methods exert their effect on the genesis of pain.

2. Interruption of conduction of the pain sensation by proper anesthetics.

3. Raising the threshold of pain receptors or the production of sedation of the higher cortical centers, with resulting amnesia. Hypnosis, scopolamine, and barbiturates are representatives of this group.

Morphine, barbiturates, hypnosis, suggestion, scopolamine, paravertebral block, anesthesia (rectal, caudal, peridural, or lumbar), ether, or chloroform may be employed during the first stage of labor. During the second stage presacral anesthesia is the method of choice, while during the third stage local or intravenous anesthesia, cyclopropane inhalation, or pudendal block are at the disposal of the physician.

Opiates should be given only in the early stages of prolonged labor. Scopolamine may provoke emotional disturbances and should be administered only in conjunction with other drugs such as apomorphine. Barbiturates must be avoided in the presence of renal, hepatic, or cardiac damage. Demerol injected intramuscularly gives very satisfactory results. It should be administered not later than 2 hours before the expected delivery.

Rectal ether anesthesia may delay the delivery, intensify postpartum hemorrhages, and produce asphyxia of the newborn. Intravenous anesthesia is suitable for vaginal procedures such as forceps delivery or breech extraction. The fetus must be delivered within 10 minutes after the injection to avoid the effect of barbiturates. Intravenous anesthesia combined with local anesthesia may also be employed for cesarean section. Trichlorethylene is toxic, weakens the uterine contractions, prolongs labor, and has an unpleasant odor. It is a useful analgesic in selected cases.

JOSEPH K. NARAT, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Current Methods of Diagnosis of Pheochromocytoma. Evan Calkins, George W. Dana, and John Eager Howard. *J. Am. M. Ass.*, 1951, 145: 880.

Reproducible symptomatic attacks associated with transient hypertension are still the outstanding manifestations of pheochromocytoma. Other manifestations of the pharmacological effects of epinephrine, such as blanching (chiefly of the extremities), palpitation, shortness of breath, nausea or vomiting, and a profuse sweat are clues to the presence of the tumor.

In many patients with pheochromocytoma, the hypertension is persistent rather than paroxysmal and presents a picture almost identical with that of essential vascular hypertension. Various pharmacological tests have been introduced to assist in identifying the hypertensions due to pheochromocytoma. There are two types of tests. The first is designed to stimulate the discharge of pressor compounds from the tumor and reproduce an attack. The second is designed to lower the blood pressure by inhibition of the tumor-secreted pressor compounds.

The most reliable agent in the first group is histamine. In 6 of 7 proved cases of pheochromocytoma, the test (rapid intravenous injection of between 0.05 and 0.0125 gm. of histamine base) precipitated clinical attacks, usually characterized by rises in the blood pressure, dilatation of the pupils, pallor, and conspicuous sweating. There were also blood pressure rises in certain neurotic hypersensitive patients, unaccompanied by other manifestations. Because of negative benzodioxan tests in many of these patients as an additional irregular finding, they were considered to have essential vascular hypertension.

The most widely used drug in the second group (the competitive inhibitors of tumor pressor compounds) is benzodioxan. Administration of this drug intravenously over a 2 minute period in a dose of 10 mgm. per square meter of body surface is followed by a significant fall in the blood pressure of many patients with hypertension due to pheochromocytoma. Nevertheless, in the authors' studies such a response was obtained in only 1 of 3 proved pheochromocytoma cases. In 2 other proved cases, benzodioxan was administered between 5 and 3 minutes prior to the injection of histamine in an attempt to block the hypertensive action of the latter. This was effectively accomplished in 1 of the cases.

Dibenamine, with pharmacological properties similar to benzodioxan, has a more prolonged effect. It also reduces the blood pressure in certain types of essential hypertension. Its results, therefore, cannot be interpreted as strong evidence in favor of pheochromocytoma.

In the use of roentgenologic technique, interpretations after perirenal air injection have been found confusing. More recently, laminograms used in 3 patients localized the tumor correctly in all. This technique would not be expected to disclose tumors of very small size or in bizarre locations.

It is apparent that pharmacological tests as mentioned are devious at best. A much more direct and safe diagnostic aid would be the measurement of the concentration of pressor substance in the peripheral blood. Goldenberg has found that pheochromocytomas contain, and presumably secrete predominantly, nor-epinephrine, which would not be expected to circulate in the normal person in measurable amounts.

These authors suggest that the development of a sensitive chemical method of measuring and differentiating epinephrine and norepinephrine in the peripheral blood would be of great assistance in the diagnosis of pheochromocytoma.

Allan K. Swersie, M.D.

Pheochromocytoma of the Adrenal Gland, with Sustained Hypertension. H. J. C. Swan. *Brit. M. J.*, 1951, 2: 440.

The usual clinical syndrome ascribed to pheochromocytoma comprises paroxysmal hypertension, sweating, and a number of symptoms referable to overaction of the sympathoadrenal system. More commonly, however, the hypertension is sustained. In a series of 51 cases selected from the literature, Green showed that intermittent hypertension was present in only 14, while sustained hypertension was found in the other 37. There is always the problem then of differentiating the case with sustained hypertension from that with common essential hypertension.

Clinically, there are features which may direct the physician's thoughts to the possibility that a tumor is present. Smithwick points out that excessive sweating was a major symptom in 9 of 10 cases of pheochromocytoma observed by his group of workers, while the incidence in hypertensive vascular disease was but 2 per cent. In addition, a low grade of pyrexia often occurs. An unduly high incidence of peripheral vasomotor phenomena are noted in the tumor group, such as blanching of the fingers, discoloration of the skin of the hands and legs, and coldness of the hands and feet. Undue lability of the arterial blood pressure suggests pheochromocytoma. The natural history of the condition may be a progression from paroxysmal hypertension through "intermittent normotension," on to sustained hypertension, with greater lability of the blood pressure in the intermediate stages. Responses to changes in posture and cold differ in both types of hypertension. In essential hypertension postural hypotension occurs only in 3 per cent of the cases. Of 9 patients

with pheochromocytoma 4 had postural hypotension. A "negative" cold-pressor reaction is not common (22%) in essential hypertension, but 7 of 9 patients with medullary tumor were found to have no significant rise in blood pressure in response to the cold stimulus.

In the roentgenographic study a downward displacement of the kidney by an adrenal tumor may be noted. Perirenal insufflation of air to demonstrate the mass is considered hazardous. Calcification in the adrenal area may offer a clue to the presence of pheochromocytoma.

Pharmacological tests for diagnosis fall into two groups. Among the substances in the first group which may act by direct stimulation of the adrenomedullary tissue and cause a discharge of pressors into the circulation, are histamine, tetraethylammonium bromide, and methacholine chloride. Of these, histamine (0.025 mgm. given intravenously) has had the most extensive trial. It is probably best suited for the production of an attack in patients with paroxysmal hypertension who are normotensive when seen. If the hypertension is sustained the results may be difficult to interpret and the side effects dangerous.

The second group of substances, the "adrenergic blocking agents" are of greater value in the diagnosis of pheochromocytoma with sustained hypertension. Among these are dibenamine, regetin, and piperidylmethylbenzodioxane. The latter drug, also referred to as 933F in the article, has had the widest use. When given by intravenous injection in a dosage of 0.25 mgm. per kilogram of body weight, 933F causes a distinct fall in the blood pressure for a period extending up to 15 minutes in a patient with pheochromocytoma. In essential hypertension there is a moderate rise in the blood pressure. Goldenberg and Aranow recorded a positive reaction to 933F in 59 patients with proved pheochromocytoma and only 3 false negative reactions. However, reports appear which stress the severe side reactions that the drug may cause in essential hypertension. In the use of 933F the physician should have a suitable hypotensive agent on hand for severe hypertensive reactions. For such excessive rises tetraethylammonium bromide and pentamethonium iodide have been used. In a case of acute pulmonary edema, venesection was performed.

The writer presents a case report of a patient with sustained hypertension who was thought to be suffering from hypertensive vascular disease and was brought in for a splanchnic sympathectomy. At operation a tumor was found in the left adrenal gland; it was diagnosed as a pheochromocytoma. This had been unsuspected. In reviewing the history, however, several features were noted which were clues to the true diagnosis. Among these were findings of patchy calcifications in the left adrenal area shown by the x-rays, complaints of excessive sweating, and facial pallor. No mention was made of preoperative pharmacological tests.

ALLAN K. SWERSIE, M.D.

Progressive Synergistic Gangrene of the Skin Following Incision and Drainage of Renal Cortical Abscess. WALTER F. WELTON. *J. Urol.*, Balt., 1951, 65: 519.

Of 112 cases of progressive synergistic gangrene collected from the literature, only 2 have been reported as following urologic procedures. In both, the gangrene followed suprapubic prostatectomies. In 1926 Brewer and Meleney pointed out that the pathologic process results from a symbiosis of hemolytic staphylococcus present in the hair follicles, with a nonhemolytic anaerobic microaerophilic streptococcus found in the intestinal tract and in certain peritoneal exudates.

The lesion appears at about the end of the first or second week postoperatively as an infection of the whole wound or as a localized induration about retention sutures. Within the next few days the wound margins or stitch holes develop carbunculoid indurated appearances. The center becomes purplish in color, and the outer advancing zone a brilliant red tint. The whole lesion is exquisitely tender. In a few days the purplish areas become frankly gangrenous.

Treatment by wide excision well beyond the red advancing zone, with the use of a scalpel or cautery, should be carried out as soon as the diagnosis is made. If this is done, the remainder of the treatment is of little importance, although activated zinc peroxide paste may be applied.

The author presents the first reported case of synergistic gangrene following operation upon a kidney.

After a long period of sepsis and increasing right flank pain, a 39 year old white man was operated upon for a cortical abscess of the right kidney. The abscess cavity as well as other pockets were opened, and 2 ounces of thick yellow pus evacuated; the field was drained. Despite an initial postoperative temperature of 98.8 degrees, the patient had a fever of 102.4 degrees by the eighth day and an intermittent septic pattern thereafter. Purulent drainage continued. Wound infection progressed and the edges became necrotic, undermined, and tender. There was a complete breakdown with a red advancing zone by the twentieth day. Examination under anesthesia revealed no undrained pockets. Wound cultures showed a staphylococcus and Bacillus pyocyaneus. Anaerobic nonhemolytic streptococci were not found. Despite peroxide irrigations, applications of activated zinc peroxide, and supportive measures, the necrosis extended in all directions, and the kidney was visible in its fossa by the thirtieth day. At operation on the forty-eighth day, the kidney was removed and the entire wound débrided. Clear yellow fluid was noted coming from the duodenal region. The patient died suddenly 4 days later. From the excised skin edges an anaerobic nonhemolytic streptococcus was cultured. Autopsy revealed no duodenal fistula, but one large abscess in the right lobe of the liver and several scattered small abscesses were observed.

It was surmised that the original infection of unknown origin invaded the liver by the portal circulation, with secondary involvement of other viscera. The kidney abscess had healed but the continued profuse drainage was due to rupture of the liver abscess to the renal fossa.

ALLAN K. SWERSIE, M.D.

The Nerve Supply of the Ureter (Beitrag zur Nervenversorgung des Ureters). A. PIEPER. *Zschr. Urol.*, 1951, 44: 17.

The author states that little is known about the innervation of the ureter.

In the embryonal development the ureter and the renal pelvis originate from the inferior end of the Wolff organ and fuse with the nephrogenic tissue at a later stage only. Therefore, the author assumes that also the nerve supply of the ureter is separate from that of the kidney.

The author studied the nerve elements of the inferior end of the ureter and the contiguous portion of the bladder in dogs, cats, horses, pigs, and in man, and found that a ganglion of bean size is present in the adventitia of the bladder wall close to the orifice of the ureter. This ganglion contains far more than a hundred cells in cross section. A large nerve originates from it and courses along the ureter in the adventitia tissue.

The writer termed the ganglion, which has not been described before, as the vesicoureteral ganglion. Although smaller sympathetic ganglia are frequently found surrounding the ureteral orifice, the author believes that this newly discovered ganglion is the main source for the nerve supply of the ureter.

WERNER M. SOLMITZ, M.D.

Ureteral Calculi: Experiences in Looped Catheter Management. MILO ELLIK and L. A. NEWTON. *J. Urol.*, Balt., 1951, 65: 532.

Among 104 patients with ureteral stone, 59 have had one or more ureteral calculi extracted by means of the looped catheter device. The authors prefer a looped catheter fashioned after the pattern of Ellik, with minor exceptions. Less sizeable wire was used for the filament, the caliber preferred being that of .005 inch in diameter. This smaller wire reduced fouling of the dual filament and enabled stiffening of the ureter by permitting insertion of an ordinary ureteral catheter stylet. This gave extra rigidity which seemed of advantage when insinuating the device past a particularly resistant impacted calculus, often at a high ureteral level. Seldom was traction required for more than 2 days before the stone was delivered and a force of 2 pounds or less was usually sufficient.

There have been some difficulties. In 6 cases ureterolithotomies were done with the loop engaged; an encircled stone was easier to remove surgically because it was understandably more conspicuous; there were 4 ruptured ureters; in 3 cases surgical drainage was performed; and 1 nephrectomy was necessary.

Four case reports with ureterograms are presented to exemplify certain dangers inherent to the instrument or its handling. ALLAN K. SWERSIE, M.D.

Biopsy of Intraureteral Tumors by Endoscopic Means. N. W. ROOME, ROSS H. FLETT, and C. M. SPOONER. *Brit. J. Urol.*, 1951, 23: 23.

Ureteral tumors are reported in the literature with increasing frequency. The authors note 283 cases of primary tumor; tumors secondary to papillary tumor of the renal pelvis are frequently observed. The diagnosis is difficult since in only one-fourth of the reported cases was tumor seen protruding from the ureteral orifice; thus, diagnoses in over half of the cases were made by the demonstration of a filling defect in the ureterogram. The authors note no published report of endoscopic biopsy of ureteral tumors.

Four cases are reported, in which successful endoscopic biopsies were made.

Following x-ray demonstration of ureteral filling defects in 2 of the cases, the 11F flexible cystoscopic biopsy forceps was used. Using a panendoscope, the forceps was passed up the ureter with the jaws closed until an obstruction was encountered. The jaws were opened and a biopsy taken. In both cases papillary carcinomas were found. It is noted that because of the age in both patients, 78 and 69 years, only a local resection with ligation of the ureteral stump was done. In the third case, because of a suggested small filling defect of the ureter on stereoscopic pyelograms, a Johnson stone basket was passed and manipulated in the lower 10 cm. of the ureter. A small piece of tissue was obtained. No tumor was found at surgery. The last case also gave a biopsy with a Johnson basket. At surgery the area was adherent to the surrounding tissues.

The methods described are fairly safe with certain limitations; gentleness should be paramount in the technique. Bleeding and perforation have not occurred and are not serious problems when care is used. The length of the biopsy forceps (used with the panendoscope) limits its use to tumors not more than 11 cm. from the ureteral orifice. The authors advise the normal practice of nephroureterectomy in cases of ureteral tumors.

NATHAN ROSENBLOOM, M.D.

Intubated Ureterotomy. DAVID M. DAVIS. *South. M. J.*, 1951, 44: 275.

For practical purposes, obstruction can be considered the only cause of hydronephrosis. When low in the ureter, obstruction can very often be treated successfully by cystoscopic mechanical dilatation. For obstruction in the upper ureter and the ureteropelvic junction, numerous operations have been devised. The Foley procedure is considered the most successful of these plastic efforts. Success depends upon prompt healing with holding of all the sutures; otherwise, the original narrowing recurs.

The article deals with correction of the stricture in the ureter by permitting the incised ureter to enlarge

itself about a splinting tube by its own proliferative powers. Following the quick regeneration of the urethra about an indwelling catheter after a good part of the circumference was cut away for stricture, experiments were performed to apply this repair principle to the ureter. Narrowed ureteral areas were incised longitudinally and intubated with tubes large enough so that the ureteral wall did not surround them. The tubes were left in place from 2 to 6 weeks with good results. Microscopic studies of slides made at different healing stages of dog ureters undergoing such regeneration showed that the muscle coats also proliferated. Postoperative study of the reconstructed ureters show normal peristalsis.

The superiority of ureteral intubation lies in its applicability to all types of cases, its simplicity, and the lack of dependence on suture; good results follow even in gross infection because the splinting tube may be left in place as long as desired. Several general considerations are detailed.

1. The kidney pelvis must be adequately drained during the period of splinting. Combination nephrostomy and ureteral splinting tubes are unsatisfactory. Straight smooth rubber tubes emerging through a pyelotomy incision function better and cause fewer complications than nephrostomy tubes.

2. Since secondary strictures may develop at the point at which the lower end of the splinting tube rests, it is desirable to bring the lower ends as far down the ureter as possible. The author describes a technique for bringing the intubating tube down through the entire length of the ureter, bladder, and urethra. The lower end of the intubating tube is fitted into a stainless steel intubating bulb which screws onto the flexible metal shaft of a Walther ureteral dilator passed up the ureter to the strictured area before operation. Traction distally brings the lower end of the intubating tube to the exterior.

3. Sand formation is prevented by a continuous drip with a buffered acid solution such as Suby's or solution G.

4. It is necessary to be certain that the ureter with the contained splinting tube follows a normal straight course to prevent angulation in healing.

5. It is important to surround the pelvis and exposed ureter with a thick layer of fat to prevent adhesions.

6. At the end of the splinting period it is desirable to remove the splinting tube while the kidney drainage tube is left in place. This enables the immediate injection of dye to determine the contour of the pelvis and the ureter, and whether the flow passes to the bladder. The drainage tube may be clamped for a day or two to make sure that the ureter functions well. If it does not, drainage is restored by unclamping the tube. The author makes certain that the splinting tube terminates in the pelvis and he keeps it in place either by stiffening it with a whalebone stylet or by means of fastening a silk thread to its pelvic end. The thread is brought to the loin exterior and fixed either by passing it through the lumen of the pelvic drainage tube or by bringing it out independently through the pelvic wall and abdominal parietes.

Illustrations are presented in the original article which offer detailed explanations of the techniques discussed. There are also numerous photographs of pyelographic studies which demonstrate the results stated to be satisfactory in about 90 per cent of all the cases. ALLAN K. SWERSIE, M.D.

BLADDER, URETHRA, AND PENIS

Case Report of the So-Called Malakoplakia of the Urinary Bladder (Kasuistischer Beitrag zur sogenannten Malakoplakie der Harnblase). ERICH HAGEMANN. *Zschr. Urol.*, 1951, 44: 9.

Malakoplakia of the bladder is a very rare disturbance; only a little over 60 cases have been published in the literature. The majority of them were described by pathologists, and descriptions of the cystoscopic findings have hardly been published at all. The etiology is unknown.

The lesions may be single or multiple, their color varies between yellowish and dark brown, and their size ranges from that of a pin point to a quarter; in most cases they are located at the trigonum Lieutaudi.

The author reports in detail the case of a 32 year old woman who suffered from chronic glomerulonephritis. Cystoscopy revealed, on an otherwise normal mucosa, two lesions of pea and bean size, respectively, which were identified as malakoplakia by biopsy. They were destroyed by electrocoagulation. Five months later a new focus had formed which was also cauterized.

Various theories concerning the pathogenesis are discussed. About half of the patients discussed in the literature suffered from some form of tuberculosis. The author considers the disturbance as a trophic degenerative process in patients with some kind of chronic disease which, in this particular case, was a severe chronic glomerulonephritis.

Various methods of therapy have been tried, in addition to excision and cauterization. Success has been reported with santonin and with parathyroid hormone. However, it should be noted that spontaneous disappearance of the foci is not rare.

WERNER M. SOLMITZ, M.D.

Surgery of True Diverticula of the Urinary Bladder (Zur Chirurgie der echten Blasendivertikel). F. GAERTNER. *Zschr. Urol.*, 1951, 44: 132.

Thirty-six operations for true diverticula of the urinary bladder are reported. In 26 patients there was a single diverticulum, in 14 the sac was on the left side and in 12 on the right side. Cystoscopically, the opening of the pouch was found to be located just above the ureteral ostium on the affected side or it was higher up on the side wall of the bladder. In 7 instances there were two pouches, one each on the right and left sides; in 2 patients there were several diverticula, so that the condition might be called a diverticulosis. No preference for either the right or the left side could be discerned.

In 27 instances the cause of the outpouching could be accounted for on the basis of prostatic hypertrophy. In some cases the prostatic adenoma was as large as a chestnut, never any larger. In 8 instances no hypertrophy could be found at operation. Here, as in the adenoma cases, the chief obstruction seemed to be provided by a sclerosis of the internal urethral sphincter, which had to be dilated or treated by a wedge-shaped excision. In a 2 year old boy with status lymphaticus the obstruction seemed to consist solely of a blockage of the internal urethral ostium by folds of edematous trigonal mucosa.

Twenty-nine of the diverticula were extirpated *in toto* following extraperitonealization; in 7 instances a circular excision of the sphincteral neck of the pouch was all that was done; as a rule, the pouches were very small. In 2 of the cases in which excision was done the diverticulum was large and the excision was required for other reasons than the size of the pouch. However, both of the excisions were entirely successful; there was no residual urine and the bladder urine became clear.

The technique of all these extirpations was the same: suprapubic incision, blunt dissection of the sac, circular incision of the layers of the diverticular neck down to the mucous layer, ligation of the unopened mucosal neck, excision of the sac beyond the ligature, and repair of the bladder wall over the ligated neck.

After this procedure the bladder was usually opened and the obstruction of the bladder neck was dealt with; the adenomas were enucleated and the neck was widened. An inlying catheter was left in the urethra and the suprapubic bladder incision was drained for a time.

All the patients with the exception of the last five of the present year have received follow-up examinations. In only 1 was the urine clouded; this patient had a large stone in the bladder. The stone was removed at this time. In all the others the urine was clear and there was no residual urine. The patients were all in excellent health.

In the entire material there were 2 deaths; the child with status lymphaticus died as the result of the lengthy anesthesia. When this anesthetic death is excluded there was 1 death which occurred as the result of an unexplained septic condition (no autopsy). This gave a total mortality of only 3 per cent.

JOHN W. BRENNAN, M.D.

Injuries to the Urinary Bladder and to the Kidneys in the Dyeing Industry (Ueber Blasen- und Nierenschaedigungen in der Farbstoffindustrie). ACHILLES MUELLER. *Helvet. chir. acta*, 1951, 18: 1.

The author's experience of more than 25 years with injuries to the bladder and kidneys in the dyeing industry, is reviewed. The material consists of 161 cases of so-called aniline intoxication, including 43 instances of papilloma, 96 of carcinoma, and 22 of hemorrhagic cystitis.

The experience in the Basel, Switzerland region has on the whole run parallel with that of the rest of the world. In fact, the industries of Switzerland have received much inspiration and help from the scientists in the rest of the world. Much in this matter has been learned by consultation with the scientists working in the Du Pont plant at Wilmington, Delaware, where much of the pioneer work in this field has been done.

The substances incriminated have been, of course, aniline and other aromatic amines (benzidine, alpha and beta naphtylamine, and even a hydrocarbon (anthracine). No agreement has been reached with regard to the modus operandi of these etiologic agents. Some think that the substances act locally, that they are carried to the bladder by the urinary stream, and fail to harm the kidneys and urinary passages above the bladder because of the absence of urinary stasis at these points. Mueller seems to favor this hypothesis and even presents the photographic reproduction of a double kidney with cancer growing in the upper portions where stasis would be apt to occur. Others think that the noxa is transported by the blood stream.

The work of Stroembeck seems rather to invalidate the last conception. Stroembeck, working on the rat, transplanted a portion of the bladder wall to the liver. In a group of 16 rats the residual bladder exhibited papilloma in 3 instances and hyperkeratosis in 9 instances after from 40 to 95 days of treatment with beta naphtylamine; in none of the animals did the transplanted portions of bladder show any alterations.

In Switzerland prophylactic treatment has taken two principal directions. The first has been toward the cleaning up and proper ventilation of the working places, together with the development of closed systems of manufacture and attempts to skip, by special methods, the dangerous products in the intermediate steps of manufacture. The second direction has been toward regular checks on the workers by cystoscopy and the assignment to the "danger spots" of only robust, young, and hereditarily sound workers with no cancer in their family.

Once the condition in the bladder has developed the benign lesions are treated by electrocoagulation and the carcinomas by bladder resection. Total cystectomy has been proposed for bladder cancer; however, the author has lacked the courage to propose such a measure to the relatively young sufferers; perhaps when greater experience has been gained with this operation and better results can be achieved, cystectomy may become the operation of choice.

Cystoscopy today permits satisfactory observation and study of bladder cancer such as can be obtained in cutaneous cancers, and much better observation than is possible in any other organ of the body.

It is hoped that the study of these tumors will eventually bring clarification of their causation and mysterious behavior; perhaps such clarification may result in the clearing up of the cancer problem as a whole.

JOHN W. BRENNAN, M.D.

Indications for, and Results of the Treatment of Sarcoma of the Urinary Bladder (Indications et résultats du traitement des sarcomes de vessie). L. DURAND. *J. urol. méd.*, Par., 1950, 56: 642.

The rarity of bladder sarcoma and the paucity of exhaustively documented reports have made it difficult to arrive at definitive decisions with regard to the proper method of treatment. Nevertheless, our conceptions with reference to the nature and characteristics of these neoplasms have of late years undergone considerable change. We no longer believe that the word sarcoma is synonymous with that of metastasis. In fact, the fear of metastases need no longer greatly influence the choice of treatment to be selected. Neither is this type of neoplasm now regarded as malignant as it was formerly. A huge intravesical sarcoma, which in an infiltrative type of epithelioma would cause the surgeon to admit defeat, is no longer regarded as an obstacle to radical treatment.

The sarcoma of the urinary bladder assumes its gravest prognosis when it is incompletely removed. This is true especially when the partial cystectomy is done through a cystotomy opening. In these contingencies the operation itself will act as a stimulus to the invasive proclivities of the new growth, causing it to rapidly infiltrate the bladder or abdominal wall.

The best treatment for any kind of sarcoma of the urinary bladder is total cystectomy. In the young in whom this tumor occurs most often, this operation is the only hope of accomplishing any great lengthening of the survival period. Even very large tumors may, together with the urinary bladder, be removed radically and the most serious factor in the mortality of such procedures will be the accompanying ureterosigmoidostomy. In young people the partial cystectomy is indicated only in the exceptional cases in which the total cystectomy is rejected because of the physical condition of the patient.

After the sixty-fifth year of life the propriety of complete cystectomy may become a matter of discussion. In these elderly patients the risk of total cystectomy is at present too great. If the tumor is limited in extent and involves the dome or side walls of the organ, partial cystectomy would seem to be preferable. If the tumor is extensive, if it involves the vesical trigone, and if other complications do not demand intervention, abstention from operation would seem logical. If, however, there is acute, or chronic, urinary retention or intolerable vesical pain, the renal complications may demand an attempt at correction or amelioration. Here, nevertheless, the bladder should never be opened and ureterosigmoidostomy would appear to be too hazardous. In these elderly individuals only endoscopic resection, cutaneous ureterostomy, or nephrostomy are to be considered. Nephrostomy, despite the grave infirmity which it entails, and despite the fact that it does not entirely turn aside the urinary stream, seems in these instances to be the procedure of choice, especially because the kidneys are apt to be gravely altered.

The lymphosarcoma occupies a special position. Because of the great irradiation sensitivity of the lymphosarcoma it would seem sufficient in the average case to perform a limited exeresis and follow this procedure with roentgen therapy. However, even here, total cystectomy, if not contraindicated, is preferable, and should, of course, be followed by irradiation therapy. In fact, the preoperative diagnosis of lymphosarcoma is extremely difficult and many authors designate not only the lymphoid tumors proper but also all round cell sarcomas as lymphosarcomas. One would not be justified in permitting the further evolution of a radiation-resistant malignant tumor which was simulating a lymphosarcoma.

JOHN W. BRENNAN, M.D.

Myosarcoma of the Bladder. GEORGE M. FISTER and ANTHONY J. LUND. *J. Urol.*, Balt., 1951, 65: 401.

During 1948 the authors encountered 2 sarcomas of the bladder. One proved to be a leiomyosarcoma while the other was a rhabdomyosarcoma.

In both instances the patient died and the cases were reported in detail. The leiomyosarcoma occurred in a white male, 62 years of age, and the rhabdomyosarcoma in a child of 10 months. Suprapubic conservative measures were doomed to failure, and the authors emphasize radical operation in these cases with special emphasis on the undesirability of opening the bladder.

The adult eventually had tumor tissue mushrooming through the abdominal wall, while the child had a massive local recurrence, despite the fact that total cystectomy had been performed after the diagnosis had been established.

Most of the leiomyosarcomas in the literature caused death within 1 year after the onset of symptoms. Metastases were rare but local recurrences were common.

Most of the reported rhabdomyosarcomas were found in children under 2½ years of age, and the average survival time was 6½ months. It is believed that any rapidly growing polypoid tumor in children should suggest this type of neoplasm. Kretschmer is quoted as having had the only patient who lived for a significant period after treatment. Special stains may be necessary to demonstrate the striated muscle.

ORMOND S. CULP, M.D.

Experiments Bearing on Disturbed Micturition in Cases of Adenoma Periurethrale. J. GLAZENBURG. *Arch. chir. Neerl.*, 1951, 3: 35.

The author seeks a satisfactory explanation for the origin of the disturbances in micturition accompanying prostatic hypertrophy. Stress is placed upon disturbed functional relationships between the varied muscular components about the bladder neck. Opinions arrived at are based in part upon experimental data on white mice in which, with artificial increases in estrone concentration, changes appear about the bladder neck. These changes show a striking resemblance to prostatic hypertrophy.

They involve an area called the "glandula coagulans" which, in comparative anatomy, is regarded as homologous to the periurethral adenoma (prostate hypertrophy).

An extensive preliminary survey is given of the anatomy, embryology, neurology, physiology, and pharmacology of the bladder neck. Pertinent points are stressed. The internal closing mechanism situated in the region of the bladder neck consists in part of muscle loops derived from the detrusor. Of these, the muscular ring known as the detrusor loop of Heiss (Wesson) surrounding the internal orifice on the ventral side is especially important. There is also a close relationship, by a system of nervous reflexes, between the varied muscular components of the bladder and the bladder neck area. The contraction of the detrusor, which is regarded as a reaction against the distention of the bladder wall, is the most important of the factors by which this system is set in motion. It is followed by a relaxation of the two sphincters. The activity of the internal sphincter is entirely subordinate to that of the detrusor, all smooth muscle. The external sphincter is under voluntary control through the pudendal nerve. There is no direct dependence between internal and external sphincters.

In his experiments, the author assumes a hormonal origin for prostatic hypertrophy, which is based in part on the observation that in older men the production of testosterone decreases, so that estrone becomes more important. In administering given small doses of the female hormone to adult male white mice, the weight of the empty bladder rose from 20 mgm. to 38 mgm. in 20 days. Removing the influence of testosterone by castration, and continuing the same estrone administration brought the bladder weight to 44 mgm., and was paralleled by symptoms leading to urinary retention. Anatomical studies showed hypertrophy of the bladder muscle with increase in bulk of smooth muscle in the bladder neck area corresponding to the internal sphincter and the muscle loops of Heiss and Wesson. The *glans coagulans* (periurethral glands) was enlarged, but was not anatomically obstructive.

Study of the concomitant functional changes was made on anesthetized animals. A fine glass cannula was fixed into the bladder and through it, and water at body temperature was injected. Through provision of a manometer, it was possible to measure the pressure at which the neck of the bladder opened (O.P.) and the pressure at which it closed (C.P.) With a modification of technique, it was also possible to measure "perfusing time" (P.T.). This was an estimation of the time required for a definite amount of fluid (2 ml.) to pass the bladder neck when the pressure was maintained at 50 ml. of water.

A series of 10 castrated adult mice were treated with estrone for 10 days; they developed a retention of urine. The O.P., C.P., and P.T. readings were much higher then in a series of 10 untreated controls. This increased functional resistance of the neck of the bladder, caused by estrone, was suppressed in another group of animals by the addition of testosterone. Further experiments with mice not treated with estrone showed that adrenalin as well as acetylcholine (or doryl) caused an increase in bladder neck resistance. This proved the presence of a cholinergic component in the closing mechanism.

In seeking the muscular component responsible for estrone-induced resistance at the neck, the external sphincter was eliminated by administration of curare. There was no change in bladder neck resistance. The use of papaverine, a general spasmolytic for smooth muscle, does overcome this resistance. By study of the effects of ergotamine, two smooth muscle components are determined—an adrenergic component less influenced, and a cholinergic component more readily influenced by this drug. It is plausible to assume that the adrenergically innervated internal sphincter is the embodiment of the adrenergic component, and the circular muscle of Heiss, the detrusor derivative, is the cholinergic component.

The author postulates that in prostatic hypertrophy the internal sphincter, under estrogenic influences, undergoes an increase in tonus. It relaxes less easily in response to detrusor contraction. More vigorous contractions of the detrusor, with functional hypertrophy, ensue. The stimulus involves the detrusor muscle loop of Heiss which, too, begins to contract and offers another obstacle to overcome in relaxing the internal orifice. A vicious cycle is generated which leads to catastrophe in the form of retention.

The author concluded that we are justified in regarding the micturition difficulty as functional, for even in the case of a complete retention, a catheter can easily be introduced into the bladder.

ALLAN K. SWERSIE, M.D.

Hypospadias: A Concept of Treatment. HOWARD B. MAYS. *J. Urol.*, Balt., 1951, 65: 279.

Because of dissatisfaction with the results after other types of repair of chordee and hypospadias, a two-stage procedure was evolved which is applicable to all degrees of the deformity. The technique has been described in detail and the author reports good functional, as well as cosmetic, results. Although he states that "repeated clinical applications have proved satisfactory," no mention is made of the extent of his experience with this plan of management.

The first stage consists of extensive denudation of the penis and wide excision of constricting bands, following the general plan of the Nesbit operation, during which much of the hooded prepuce is redeployed to the ventral surface of the penis. As a part of this first operation, the author constructs a pedicle tube graft from a segment of the shifted skin, and tunnels this through the glans penis.

The remainder of the new urethra is formed by the Thiersch-Duplay method after an interval of from 2 to 6 months. Urine is diverted by a tube, of the McIver nephrostomy variety, which is

brought out through a suprapubic cystostomy with the narrow opposite end used as a splint in the new urethra.

Excellent drawings amply illustrate the important steps in both stages of the repair.

ORMOND S. CULP, M.D.

GENITAL ORGANS

Bilateral Intramural Strictures of the Ureters After Transurethral Resection of the Prostate. VINCENT J. O'CONOR. *J. Am. M. Ass.*, 1951, 145: 1249.

Occlusion of the lower end of one ureter, or of both ureters, due to fibrosis and scarring from electroresection of the prostate is a commoner postresection complication than has previously been recognized. This complication in 3 cases herein reported resulted in complaints of urologic symptoms due to urinary infection and hydronephrosis.

Diagnosis was made by intravenous pyelograms and cystoscopy with attempted retrograde catheterization of the ureter.

In 1 patient who had undergone repeated resections for carcinoma of the prostate, a palliative ureterostomy was performed. In the 2 remaining patients in this series, bilateral reimplantation of the lower end of the ureters after spatulation into the bladder gave excellent results and pronounced symptomatic improvement, decreased the urinary infection, and improved the renal function.

HERBERT J. KAROL, M.D.

Cancer of the Prostate (Cáncer de próstata). MANUEL RIVEROS, CARLOS MAAS, and SANTIAGO PASTORE. *Prensa méd.*, argent., 1951, 38: 175.

After reviewing the history of cancer of the prostate and evaluating its present status, the authors report on 10 patients who were treated by them with orchectomy, estrogen therapy, or both. The early evidence of clinical improvement was spectacular in all instances. Relief of pain, improved appetite with rapid gain of weight, decrease of anemia, and sometimes disappearance of the primary tumor were the immediate effects.

The late results were not so satisfactory. Four patients died in the present series. In 2 of the 4 fatal cases, the primary neoplasm became soft and remained clinically atrophic, while the disease grew in its metastatic location and caused death in 14 and 16 months, respectively, after orchectomy. Estrone therapy applied at the moment when pains in the bones occurred proved completely useless.

Four patients continued well and showed no signs of metastases in a follow-up from 2 months to 4 years. Although the effects of orchectomy seemed to be at times very profound and prolonged, the authors believe that it would be premature to suggest that any of these patients have been cured. In conclusion, they recommend orchectomy and, especially, estrone therapy as the most effective palliative treatment in advanced cases of carcinoma of the prostate.

OLGA M. HARING, M.D.

Sarcoma of the Prostate (Sarcomes de la prostate). ALFONSO DE LA PENA. *J. urol. méd.*, Par., 1950, 56: 626.

Two instances of sarcoma of the prostate, both observed fairly recently by the author, are reported. One was a round cell sarcoma in a child of 9 months. The progress of the neoplastic process was rapid and apparently little influenced by irradiation therapy. In spite of derivative cystotomy and roentgen therapy in large doses, death occurred 2 months after the first examination by the author, and 9 months after the first clinical manifestations. The second instance was that of a polymorph-celled sarcoma in a male 42 years of age. A series of cystographic roentgenograms in this patient show the enormous size of the intravesical tumor mass, its diminution after a month of intensive roentgen therapy (7,000 roentgens), and its final disappearance (clinical cure) after a year and a half. Here the time is still too short to speak of permanent cure.

In each of the patients the simple roentgenogram was of no help in the diagnosis; however, the shadow cystogram was characteristic and puncture biopsy brought certitude, both with reference to the presence of prostatic sarcoma and its histologic entity. The author believes that every male under 40 years of age presenting a tumor of the pelvis of rapid evolution, infected or not, should be suspected of having sarcoma.

Less than 225 instances of prostatic sarcoma have so far been reported in the literature; however, anaplastic carcinoma is easily confused with true sarcoma and probably accounts for a certain proportion of these reported cases. Stevens and Barringer (*J. urol. med.*, Par., 1940, 44: 83) report 16 cases of prostatic tumor of which 3 were certainly, and 6 were clinically suspected, instances of anaplastic carcinoma.

The author agrees with Pfahler, G. Marion, Hess, and the majority of other authors that, in view of the meagerness of surgical methods in the treatment of prostatic sarcoma, there should at present be exclusive preference in these cases for irradiation therapy. In fact, the sensitivity of the tumor to irradiation is the best indication of the treatment to be followed, as well as a good test for the diagnosis and for prognosis. The results vary with the age of the patient, which agrees with the author's experience in cases of renal blastoma.

JOHN W. BRENNAN, M.D.

Congenital Anomalies of the Testicle. OSWALD S. LOWSLEY and ENRIQUE PORRAS. *J. Internat. Coll. Surgeons*, 1951, 15: 332.

The authors recommend the correction of congenital anomalies of the male genitalia before puberty and review a few of the abnormal variations that may be encountered.

Attention is directed to the fact that many cases of alleged polyorchidism have been poorly substantiated. Too frequently the diagnosis has been made by palpation alone or by operative observations without microscopic confirmation. They have added

another authentic case to the 18 true instances that were found in the literature. Their patient was an 11 year old boy who entered the hospital because of an undescended testis. When his inguinal region was explored, an ill-defined mass of tissue was found along the spermatic cord and biopsy revealed testicular tissue.

Such supernumerary testes may differ in type. Usually the two testes have a single vas and an epididymis that serves both. The entire tract may be duplicated, or the extra testis may have neither vas nor epididymis. On occasion the supernumerary vas and epididymis have opened into the normal one on the same side. In the majority of cases the extra gonad is small and lacks the ability to form spermatozoa.

Twelve cases of torsion of an intra-abdominal testis were collected and another case was added to the literature. In the latter case the testis also contained a small malignant tumor, as did 6 testes in the 12 reported cases.

Twenty-four examples of transverse ectopic testis were found in the literature. Another personal case was added; in this case the testis also contained a malignant tumor and apparently was the first such case on record. Some consideration is given to the various types of testicular ectopia, including the inguinal, pubopenile, femoral or crural, perineal, pelvic, and transverse varieties. In patients with transverse ectopia the testis descends by the same canal and occupies the same side of the scrotum as its fellow.

When the testes fail to descend normally and hormonal therapy has been unsuccessful, the authors insist that orchidopexy is mandatory. In the correction of cryptorchidism, they prefer to fix the testis to the thigh and release it at a later date. Preservation of the blood supply, adequate fixation in the bottom of the scrotum, and cure of the concomitant hernia are said to be important factors in any type of orchidopexy. ORMOND S. CULP, M.D.

Metastases in Malignant Tumors of the Testis: Clinical Aspects and Principles of Treatment. MARTIN LINDGREN. *Acta chir. scand.*, 1951, 101: 127.

The author analyzed the records of 55 cases of treated malignant testicular tumors and found that metastases are sometimes responsible for the first clinical symptoms of the tumor. The differential diagnostic difficulties are discussed. It was pointed out that in the presence of obscure abdominal symptoms in men, metastases should be suspected and the testes should be examined.

The frequency of occurrence and symptomatology of abdominal metastases are described; the value of excretion urography for locating the metastases is stressed. The prophylactic and therapeutic possibilities of irradiation are discussed.

ROBERT TURELL, M.D.

Fournier's Gangrene. DENIS EBRILL and M. O'DONOGHUE. *Brit. J. Urol.*, 1951, 23: 56.

Spontaneous idiopathic gangrene of the scrotum was first described by Fournier in 1884, and is characterized by sudden onset in an apparently healthy individual, rapid and intense toxemia, extensive necrosis followed by more rapid sloughing than is usually seen in other types of gangrene, and an unimpressive bacteriologic picture.

The patient whose case is reported by these authors was 50 years of age and he presented the customary clinical picture. Penicillin was given for 12 days and he recovered 2 months later without surgical interference.

Various etiologic theories were considered but contradictory evidence was available in this case to discredit all of the popular explanations of the disease. ORMOND S. CULP, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Frozen Shoulder. ROBERT K. LIPPMANN. *Surg. Clin. N. America*, 1951, 31: 367.

Frozen shoulder is said to be more common during the fifth and sixth decades, with a greater frequency in women, and the left shoulder slightly more commonly afflicted. The author states that a triad of signs are encountered: (1) pain at the limits of motion, (2) limitation of motion, and (3) tenderness over the bicipital groove. It is further stated that adduction limitation is almost pathognomonic of frozen shoulder.

In the differential diagnosis, arthritis and stiff shoulder from neglect and inactivity must be considered. This entity would best be explained by a noninfectious diffuse fibroplastic inflammatory process involving the anterior and inferior capsule and including the bicipital tendon and sheath.

Surgical exploration of the shoulder during the healing phase of frozen shoulder revealed that the tendon is glued down to the humerus at the bicipital sulcus. It is believed that physiotherapy plays an unimportant role in the treatment of frozen shoulder. This holds true for x-ray therapy. Early manipulation in this condition serves only to increase the violence of inflammatory reaction.

The author suggests that the simplest method of approach and relief from this condition is the direct suture of the tendon to the surrounding tissues. Where there is intense pain simple palliative methods, such as immobilization in a sling, or direct application of heat or cold, have been found valuable. RICHARD J. BENNETT, M.D.

Vertebral Retroposition (Reversed Spondylolisthesis). H. W. GILLESPIE. *Brit. J. Radiol.*, 1951, 24: 193.

A study was made of the frequency of vertebral retroposition in a series of 493 lumbrosacral disc protrusions confirmed at operation. It was found that 77 cases (15.6 per cent) showed a more or less pronounced true retroposition of the fifth lumbar vertebra over the first sacral segment. Thirty-five of these 77 cases were used for a more detailed examination into the various aspects of retroposition. The average backward displacement in these 35 cases ranged from 0.3 cm. to 0.9 cm. The most important result, from the study of vertebral retroposition, is that the majority of these cases are associated with a reduced intervertebral space at the same site. Thirty out of 35 (85.7%) cases were associated with a definite reduction of intervertebral space; a normal disc space was seen in 5 out of 35 (14.3%). To the latter group belong those cases of vertebral retroposition that are of congenital origin, sometimes associated with an acute lumbosacral angle.

Retroposition may occur at any level of the spine. As with disc prolapse, it is most frequently found in the lumbosacral region and in the cervical spine. In cases of multiple disc degeneration, associated with osteoarthritis, retroposition may occur anywhere in the spine. It is not infrequently seen in the lower dorsal or upper lumbar vertebrae. In the majority of cases, retroposition is the result of a facet-inclination favorable to backward sliding and a disc disease, which may be due to (1) disc protrusion, as in the present series, (2) disc degeneration, in association with spinal osteoarthritis, (3) rheumatoid spondylitis, (4) infection of tuberculous or staphylococcal etiology, and (5) trauma. The contention that vertebral retroposition is a cause of backache can no longer be maintained. The value of this finding lies in the fact that it is a useful radiological indication of disc changes which, in their turn, may be the cause of clinical manifestations.

The influence of posture on vertebral retroposition was also examined and, contrary to some writers, once there was evidence of true posterior displacement, the retroposition could not be appreciably reduced or eliminated, whether the spine was in hyperextension or flexion, or the patient was in a recumbent position or standing upright. In a doubtful case, it is therefore advisable to examine the patient not only lying down but standing up, until a radiograph is obtained that shows no double posterior borders, but an accurately superimposed and sharply defined outline of the vertebral body.

C. FRED GOERINGER, M.D.

Protrusion of the Acetabulum or Otto Chrobak Pelvis. A Contribution to the Pathogenesis and Roentgen Symptomatology (Die Protrusio acetabuli, Otto-Chrobak'sches Becken. Ein Beitrag zur Pathogenese und zur Roentgensymptomatologie). F. KLOPFER. *Fortsch. Roentgenstrahl.*, 1951, 74: 323.

Three cases of intrapelvic protrusion of the acetabulum, together with the roentgenograms, are presented. These 3 cases are intended to supplement the observations of Hayd (*Zschr. Orthop.*, 1949, Vol. 79) and the publications of Brentrup (*Arch. Orthop. Unfallchir.*, 1942, Vol. 42), who reported in a family the occurrence of bilateral protrusion of the acetabula in the mother and bilateral luxation of the hip in the daughter.

The first example was that of a 35 year old woman who had been complaining of vague back pains since her seventeenth year of life. Roentgenologically the "too thin" floor of the acetabulum bulged inward. The roof of the acetabulum did not exhibit any marked changes; however, the femoral head was somewhat flattened. The lower portion of the femoral head had pushed the floor of the socket relatively deeply inward. There was a collar of thickened bone about the neck at the border be-

tween the head and neck of the femur (Halskrause), and the internal trabecular pattern of the coxal portion of the femur was altered from the normal in that the heavy medial pattern was shifted laterally (shifted supportive stresses). The pelvis was, on the whole, relatively little affected; however, symmetrical transformation zones were observable at several places. These zones were similar to those often ascribed to certain endocrine disturbances and to the osteopathies of late rachitic osteomalacia. The condition was regarded as originating on a hereditary basis and was present bilaterally.

The second example was that of a 50 year old woman with marked changes of the nature of protrusion of the acetabulum on the left side. The socket had undergone a pronounced bulging into the pelvic cavity. There was a marked reactive thickening of the floor. The cylindrically deformed femoral head harbored a cherry-sized detritus-filled cyst. The articular cleft was markedly narrowed. On the right side was observed the end result of an old luxation of the hip joint with neoarthrosis above the original socket which had entirely disappeared. The patient herself reported an accident, when 14 years of age, in leaping from a wagon which caused detachment of the femoral head. This condition was therefore believed to be traumatic in origin and to be the result of faulty static conditions in the left joint. Another roentgenogram, taken 2 years later, showed the condition on the left side to have become even more pronounced and the deterioration was attributed to the beginning osteoporosis of old age.

The third example was that of a 42 year old woman with evident roentgenologic signs of an old arthritic process in the left coxal joint. The acetabulum bulged inward and its floor was thickened. This condition was regarded as the result of an infectious arthritis.

Thus, the author believes that two kinds of protrusion of the acetabulum may be differentiated: a congenital, or hereditary, type which involves principally the female sex, and an acquired form which may affect either sex. JOHN W. BRENNAN, M.D.

Vascular Epiphyseal Changes in Congenital Dislocation of the Hip. WILLIAM K. MASSIE. *J. Bone. Surg.*, 1951, 33-A: 284.

This is a lengthy article in which numerous tables and figures are presented. Many different phases of congenital dislocation of the hip are discussed. The author believes that the occurrence of vascular changes in hips reduced after the age of 1 year is neither predictable nor preventable at the present time. In the series of cases presented, 35 per cent of hips showed definite vascular changes and an additional 20 per cent had the x-ray appearance of partial involvement. Early recognition is imperative so that treatment may be inaugurated.

As a result of these studies, the author believes that weight-bearing should be prohibited until x-ray films show the femoral head to be well healed.

RICHARD J. BENNETT, M.D.

Arthritis of the Hip. FRANK E. STINCHFIELD. *Surg. Clin. N. America*, 1951, 31: 521.

After describing the two main categories of arthritis, the atrophic or rheumatoid type and the degenerative or osteoarthritic type, the author proceeds to a discussion of treatment by several available procedures.

Conservative treatment may include bed rest, traction, medication for pain, physiotherapy, x-ray therapy, and cortisone therapy. This régime is particularly desirable in a case, for example, in which the patient has an acute inflammation of the hip joint due to trauma. Local heat, and salicylates in sufficient dosage to ease the pain will often bring improvement in a short period of time. In acute rheumatoid arthritis of the hip also, the initial treatment should be conservative. Acute osteoarthritis of the hips may become completely symptomatic under conservative therapy. If the hip joint is in a poor weight-bearing position, there is a predisposition to osteoarthritis and further limitation of motion. To counteract this tendency, the hip should be extended until the mechanics of the joint are improved.

Exercises must be kept within the limits of pain and fatigue. Over-enthusiastic employment of physiotherapy may be followed by decreased motion, due to muscle spasm, within a period of 24 hours.

ACTH is of great value in the treatment of arthritis of the hip. Its use permits much more active physiotherapy than is possible without it. Techniques employed include standard resistance exercises, forcible abduction, adduction, and flexion and extension of the hip, always carrying these exercises beyond the point of mild pain. Such exercises are carried out for a minimum of 2 weeks in the hospital, the patient receiving 100 mgm. of cortisone daily. At the end of 2 weeks the patient is allowed to leave the hospital but he returns for physiotherapy 3 times weekly. He is given 100 mgm. of cortisone at each visit. After about 3 additional weeks, injections of cortisone are discontinued. It has been found that joint motion does not regress as it formerly did, but seems to be maintained. The patient is instructed, however, to continue his own exercises at home, and after the cortisone is discontinued he must not exercise beyond the point of pain.

Should conservative measures fail to give the desired relief, one of several surgical procedures may be elected. In the case of bilateral rheumatoid arthritis, in which the patient is prevented from sitting with ease and comfort, it may be imperative to perform an arthroplasty. The patient, however, must be co-operative and anxious to obtain a good result, and therefore willing to work intensively and conscientiously on postoperative exercises. In general, the patient should be in good physical condition, should be carefully evaluated by an internist, and be well over the acute stage of his disease.

Those conditions (in the order listed) which have responded most favorably to arthroplasty are as follows: (1) slipped femoral epiphysis; (2) arthritis

secondary to trauma; (3) osteoarthritis of undetermined origin; (4) congenital dislocation; (5) postrheumatoid hip, and (6) postinfection or postsuppurative hip.

Recent experimental work has shown that the employment of cortisone retards fibrous and connective tissue formation. Accordingly, 50 mgm. of cortisone are injected into the joint at the time of surgery, and a similar injection is given on the second postoperative day; and beginning on the seventh postoperative day, 50 mgm. of cortisone are injected intramuscularly, daily for 3 weeks.

With adequate postoperative treatment, one may expect relief of pain in about 75 per cent of the cases.

A second elective surgical procedure is that of arthrodesis. The operation may be indicated in cases in which (1) the arthritis is limited to one hip, (2) there has been extensive destruction of the joint, (3) motion is limited more than 70 per cent, and (4) the patient has sufficient pain to be willing to submit to an arthrodesis, knowing that he is going to have an immobile hip.

Important disadvantages of hip joint arthrodesis are (1) the long period of postoperative immobilization required, and (2) increased strain on the back and knees, which may result from the loss of function of one joint.

The best position for arthrodesis of the hip is in 30 degrees of flexion, neutral abduction and adduction, and neutral external and internal rotation. Those cases which frequently are best treated by arthrodesis include old suppurative arthritis of the hip joint, congenital dislocation of long standing, old poliomyelitis with dislocation, and osteoarthritis of the hip. In a study of 117 patients who had had the operation of arthrodesis of the hip, it was found that the pseudoarthrosis rate was 23 per cent; the mortality was 3 per cent. The gait was deliberate and acceptable in patients with neutral abduction and adduction without shortening. The most certain method of producing arthrodesis was by intra-articular fusion plus a bone graft, plus a nail of the Smith-Petersen type for internal fixation or intra-articular fusion, plus the insertion of three vitallium nails. When solid bony fusion of the hip joint is secured, the result is very satisfactory. All patients whose cases were studied felt they had been decidedly benefited by the operation. In general, individuals who must walk long distances and do heavy manual work profit more from hip joint arthrodesis than do desk clerks, secretaries, or administrators.

Other procedures discussed are those of neurectomy and osteotomy. Osteotomy is performed for the purpose of changing the burden of weight-bearing which ordinarily is at a poor angle in an arthritic hip. The most common procedure is the one described by MacMurray, in which a subtrochanteric osteotomy is performed and the shaft is displaced medially so as to make a direct weight-bearing line from the head to the shaft of the femur. It is probably less traumatizing than a long arthrodesis procedure.

In conclusion, it can be said that there is no hip that is so far destroyed in any patient that he cannot receive help by nonsurgical or surgical measures, or both. Each case must be considered individually.

KENNETH SHERMAN, M.D.

Tuberculosis of the Hip; A Follow-up Study of 58 Cases, with Special Reference to Fusion Results in Young Children. HORACE I. YU. *J. Bone. Surg.*, 1951, 33-A: 131.

This is a statistical analysis of 58 tuberculous hips, 35 of which were in children. The diagnoses were proved in the laboratory in all but 8 cases, and in the latter there was very strong clinical evidence that the diagnosis was correct. Fusion was done in all of the patients except 2, in whom fusion occurred spontaneously, and 1 other patient who completed his treatment at another hospital.

The primary site of the infection was determined in 35 of the hips. This was either in the acetabular roof or in the neck of the femur in all but 4 of the children in whom the origin was in the synovial membrane. In the adults, 10 of the 11 hips in which the primary site could be determined showed that the infection had started in the synovial membrane.

A great majority (47) of the primary fusions were done by extra-articular grafting or a combination of this with the use of intra-articular chips. Fusion was finally obtained in 87.8 per cent of the children and in at least 74 per cent of the adults. The children required more than one fusion in more than half of the cases, while in only 3 of the 17 adults in whom fusion was obtained was more than one operation necessary. The author believes that many of the children would have developed bony fusion if enough time had elapsed before the secondary fusion operations were done. He believes that some failures occurred because immobilization was inadequate or was not continued for a sufficient length of time, and that ambulation was begun too soon after surgery. He points out that fusion occurred with the position of the hip considerably altered from that in which it was placed at the time of surgery, and deduces that immobilization could not have been complete. There was a high percentage of sinus formation following surgery: 54 per cent in the children and 48 per cent in adults.

Fusion rarely occurs spontaneously in tuberculosis of the hip. The 2 cases in which it occurred in this series appear to have been caused by secondary infection. Early fusion in small children appears to be justified, as the operation was successful in a good percentage of cases and succeeded in preventing the distressing deformities which usually follow long-continued conservative treatment in young children.

The average time for definite fusion to appear after arthrodesis was 15 months in children and 12 months in adults. An additional year or more is usually required before transarticular trabeculae are well established. The author thinks that a secondary fusion operation should not be undertaken before the average time for fusion has elapsed, and that ambu-

lation should not be permitted before the sixth month. NEWTON C. MEAD, M.D.

Pseudarthrosis of the Tibia in Childhood. BRYAN MCFARLAND. *J. Bone. Surg.*, 1951, 33-B: 36.

Since the author first reported the use of the by-pass graft in 1940, 7 additional patients with pseudarthrosis of the tibia have been treated, which makes 9 in all in the author's personal series. This type of graft has been used by other surgeons in 2 cases, and these are also considered.

The results of the by-pass grafting operation in 11 cases of pseudarthrosis of the tibia in childhood are presented. The operation was successful in securing sound union of bone in 9 cases, and unsuccessful in 2 cases.

One of the successful cases is of special interest. A boy, aged 12 years, had previously been treated elsewhere, first by an inlay graft and later by a by-pass. His parents were unwilling for another piece of bone to be taken from his sound tibia. The affected leg was opened with the intention of packing iliac chips into the angle at the lower end of the graft, which had been placed too high and too far medially, but on inspection at operation this was thought to have a poor chance of success. The existing graft, therefore, was first removed, together with a three inch length of tibia, to which its upper end was fused; and the composite bone (part graft, part tibia) was reversed so that the upper end became the lower, and was implanted in the usual way. Sound union ensued.

The author's present view is that angulation and fracture are coincident, and that the bending stress continually maintained by the muscles stimulates bone resorption to a greater degree than the body can tolerate. Under the bending stress the woven bone with which the body attempts to heal the fracture breaks down as quickly as it is formed. The struggle between repair and destruction gives rise to the typical appearance of these fractures.

It is suggested that the pseudarthrosis results from a fatigue fracture of a congenitally abnormal tibia, but that its persistence depends entirely on mechanical factors. There is evidence to suggest that the underlying congenital abnormality may arise from dysplasia of the mesenchyme.

C. FRED GOERINGER, M.D.

The Management of Bone Tumors; Some Debatable Problems. NORMAN L. HIGINBOTHAM. *Surg. Clin. N. America*, 1951, 31: 317.

The author presents the classification of bone tumors adopted by the Bone Sarcoma Registry, with a few modifications. He suggests that fibrosarcoma is a distinct entity, as is chondrosarcoma. The author further believes it is a great error to institute treatment of any bone tumor without microscopic examinations. There is some question as to whether the clinician, the roentgenologist, or the pathologist should have the final word in diagnosis, and the answer is: they must all work together. It is reasonably true that correct diagnosis can be made in about 80 per cent of cases of bone tumor on the clinical and roentgenological diagnosis, but it is agreed that the microscopic findings are more reliable, particularly when interpreted by a pathologist who is experienced in bone tumors.

Then there is the question as to whether surgery or radiation therapy should be used. Of course, the answer is to use one or both in the best interest and welfare of the patient.

Primary reticulocell sarcoma has proved to be a highly radiosensitive tumor with an encouraging degree of radiocurability.

Endothelioma of bone (Ewing's sarcoma) is similarly regarded as a highly radiosensitive tumor. Coley's toxin should be given to these patients also.

Osteogenic sarcoma is practically always a surgical problem. Benign bone tumors are notoriously radioresistant. The treatment of giant cell tumor is a very controversial subject. The question of single or multiple trauma causing a tumor is a very debatable subject. RICHARD J. BENNETT, M.D.

Diffuse Reticulosarcomatosis of the Skeleton. Preliminary Report on 2 Cases (Reticolosarcomatosi diffusa dello scheletro. Nota preventiva su due casi). A. PIAZZA and L. OLIVA. *Minerva med.*, Tor., 1950, 41: 1331.

Two cases of reticuloendotheliopathy are reported. The studies are not yet completed; however, the authors believe that a preliminary discussion of the data so far procured is justifiable from the roentgenologist's standpoint.

Both patients were males, the one 17 years of age and the other 41. The clinical symptoms and disease course were very similar in both patients, consisting in the main of pain in the lower extremities and in the lumbar portion of the spine. Later, tumefactions developed on the skull and face. The course of the disease was in both instances very rapid, terminating in death at the end of 8 and 6 months, respectively.

Roentgenologic examination disclosed in each instance a disseminated, destructive skeletal involvement in the form of illy defined shadows with accompanying extensive osteoporotic changes, affecting in the one (the youth) the pelvis, the lumbar spinal column, the right lower extremity, and the skull (diastasis of sutures), and in the other (the adult) the cranium, the lumbar vertebral column, and the sixth rib. In the squamous portion of the left temporal bone in this latter patient was an extensive osseous defect; however, its edges were vaguely delimited and did not at all resemble the lacunar skull in Hand-Schueller-Christian disease.

Biopsies on both patients, and later autopsies, confirmed the diagnosis of reticuloendotheliopathy. In the exact placing of these findings in a classification the authors accept in general the classification of this condition as given by Businco (*Mem. Acc. Sci. Bologna*, 1946–1947, 4:). Nevertheless, purely from a roentgenologist's point of view, the authors' attempt at placing the particular type of tumor reported

would seem to require a revision of Businco's classification with special consideration of the roentgenological findings. Their classification is as follows:

Mixed reticuloendotheliopathy:

A. Diffuse
   1. Malignant
      a. Reticulosarcomatosis systemica
      b. Monocytic leucemia
   2. Benign
      a. Diffuse granulomatosis of known or unknown etiology and with or without abnormal accumulations, such as in Hand-Schueller-Christian disease (abnormal storage of lecithin), Besnier-Boeck-Schaumann disease, morbus Gaucher, and morbus Juengling.

B. Localized
   1. Malignant
      a. Reticulothelial sarcoma
      b. Malignant granuloma
      c. Ewing's sarcoma
   2. Benign
      a. Eosinophile granuloma of the bone with or without abnormal accumulations.

The authors placed their tumor type with the malignant diffuse form of mixed reticuloendotheliopathies and specifically diagnosed it as a reticulosarcomatosis systemica. JOHN W. BRENNAN, M.D.

The Protein Pattern of Joint Exudates. B. OLHAGEN. *Acta orthop. scand.*, 1950, 20: 114.

It is difficult to obtain sufficient analytical material from the joints of man, with the exception of the knee joint. A knowledge of the protein conditions of joint fluids, therefore, is based on the conditions seen in certain animals, such as the horse and cow.

The qualitative analysis of the proteins in joint exudates has been considerably facilitated by the Tiselius electrophoretic method. Comparison between the actual exudate and the patient's plasma has been found especially valuable. Unfortunately, with the electrophoretic aid it is not possible to differentiate the acute exudate in the initial stage of rheumatoid arthritis from the joint fluid in rheumatic fever. The author concludes that no reliable guidance can be given in such determinations.

Various factors influence the electrophoretic pattern: the duration of the exudate exerts an influence because the longer it has continued the higher becomes the rate of the αglobulin content. Just as albumin with its low molecule weight penetrates more easily the so-called synovial membrane, it is plausible that the smaller molecule is again reabsorbed more quickly when the acute exudative phase has ceased and the process of repair has begun. In rheumatoid arthritis the mesenchymal tissue changes—which are recognized by the swelling of the capsule—are more extensive than in the case of acute arthritis, and this may affect the reabsorption velocity. One may interpret the exudate as a sign of the local change of the capillary permeability in the joint capsule. In instances of traumatic hydrops of some weeks' duration one finds that the relative distribution of the protein components in the exudate is about the same as in plasma, with a little higher albumin and αglobulin values. A high total protein content and a relative increase of globulin argue more in favor of tuberculosis, while a total protein content below 4 per cent and low αglobulin values suggest nonspecific hydrops. The latter finding is generally observed in conjunction with a normal protein distribution in the plasma and a correspondingly normal sedimentation rate, which are not often encountered in tuberculous synovitis.

It is suggested that in cases of exudation of undetermined genesis there are good reasons for analyzing the protein pattern of the plasma also, as this analysis may provide useful information for the diagnosis of a joint affection. On occasion, the plasma analysis may lead to a diagnosis of myeloma. Other methods of examination should include a thorough serological analysis of the patient's serum (including gonococcus complement fixation tests), determinations of the antistreptolysin and antistaphylolysin titers, and also investigations of the agglutination of streptococci and sensitized sheep red cells.

C. FRED GOERINGER, M.D.

The Normal Morphology of the Joint Fluid. HJ. HOLMGREN. *Acta orthop. scand.*, 1950, 20: 97.

The author reports a study of the cellular elements in the joint fluid of animals. These elements arise from the innermost layer of the capsule and from adjacent connective tissues. The joint fluid is a clear mucinous fluid, which in normal cases is found in minute quantity forming a thin film covering the inside of the joint cartilage and joint capsule.

Davies points out that a high cell count is accompanied by an abundance of phagocytes and high viscosity of the joint fluid. With decreasing viscosity not only is the cell count lower but degenerative cell types appear. In the joint fluid, cells of mesenchymal origin are found which secrete a mucin type of substance. The cell count is low and usually changes from joint to joint. In animals the cell contents of the smaller joints of the extremities is lower than that of the larger joints. The nuclear cells may be divided into two big groups: (1) phagocytic cells and (2) nonphagocytic cells. The first consists of monocytes, clasmatocytes, and leucocytes, the latter, of lymphocytes and synovial cells.

From 90 to 95 per cent of all the cells in the synovial fluid from cattle have phagocytic properties, 91.6 per cent of the cells in the fluid being phagocytes and 8.4 per cent being nonphagocytic.

Coggeshall made a study of the knee joint fluid from 28 patients (human beings). The fluid was taken 30 minutes after death. There were no red blood cells, but the following cell types were found: polynuclear cells, monocytes, clasmatocytes, histiocytes, lymphocytes, and synovial cells. The number of cells varied from 13 to 100 per millimeter.

C. FRED GOERINGER, M.D.

Some Views on the Pathology of Synovial Fluid. CARL HIRSCH. *Acta orthop. scand.*, 1950, 20: 121.

Synovial fluid is a dialysate of the blood plasma to which mucin has been added. The mucin is very likely to originate from the perisynovial and subsynovial connective tissue. The amount of protein varies with the degree of inflammation. The protein rate is low in traumatic conditions but is considerably raised in severe rheumatoid and septic conditions. A traumatic exudate has a relatively high viscosity. Infective synovial fluid shows a reduced viscosity due to the lower concentration of mucin. In normal joint fluid, the total number of cells varies from 15 to 180 per cubic millimeter, the average being 63. In acute arthritis the white cells in the synovial fluid range between 1,200 and 12,000; in chronic arthritis the number is about 300. The total protein values usually correspond to the number of white cells found in the exudate. Forty-eight per cent of all white cells are monocytes; 25 per cent are lymphocytes; 10 per cent are clasmatocytes, and the remainder of the cells are composed of synovial cells and nonclassifiable cells.

The bilirubin content in the joint fluid corresponds to the amount of hemorrhage that has taken place within that joint. The content of bilirubin in a hemorrhagic joint is small in the first few days and its concentration increases as time goes on and more red cells are destroyed. The content of bilirubin within the joint cannot be used to differentiate between hemorrhage due to trauma and that due to tumors or other causes. In cases of intra-articular fracture, venous blood, rich in bilirubin, may enter the joint and immediately yield a high icteric index. It can, therefore, be concluded that if the bilirubin content of the joint fluid is high within the first 24 hours after the injury, it is very suggestive of an intra-articular fracture. The fat content of the synovial fluid is also increased in intra-articular fractures and, according to the origin of the fat, it may be composed of stearates which are of firm consistency in room temperature, or they may be composed of oleates which are fluid at room temperature. These tests have only academic interest because x-ray examination more easily determines whether or not there is a fracture within the joint.

GEORGE I. REISS, M.D.

Xanthomatous Joint Tumors. W. L. MINEAR. *J. Bone Surg.*, 1951, 33-A: 451.

The authors present 5 cases of xanthoma of various joints. They state that Gustav Simon reported the first such case of an xanthoma in the knee joint, in 1865. This makes a total of 81 joint xanthomas described in the literature.

The clinical features are discussed. The disease occurs slightly more frequently in males than in females, and the majority of patients are between 20 and 40 years of age. The lesion occurs mainly in the knee joint. It may be solitary, multiple, or diffuse in type. A history of trauma to the joint is frequent. Pain, swelling, palpable tumor, and slight interference in joint function are common signs of the disease. Aspiration of the joint produces thick orange-brown fluid. Roentgenograms show a noncalcified soft tumor mass often associated with pressure erosion of bone. The presence of cholesterol in large amounts is pathognomonic. Treatment consists in excision. DONALD C. GEIST, M.D.

Synovial Sarcomas. JOHN F. TILLOTSON, JOHN R. MCDONALD, and JOSEPH M. JANES. *J. Bone Surg.*, 1951, 33-A: 459.

Synovial sarcomas may be defined as malignant tumors of synovial origin. They arise from any one of the three synovial structures, that is, joint capsules, bursae, and tendon sheaths. Malignant tumors may develop from either of the two layers which make up the synovial membrane. A tumor arising from the supporting layer of fibrous tissue may be indistinguishable from a true fibrosarcoma; a tumor arising from the intima presents a typical picture of synovial or adenomatouslike elements mixed with those of fibrosarcomatous appearance. The authors did not attempt to include the synovial fibrosarcomatous group in their series. Consequently all of the tumors in their study showed, at least in some places, the characteristic synovial elements.

Two separate types, namely, the adenomatous type and the fibrosarcomatous type, were recognized.

Macroscopically, synovial sarcoma is difficult to identify since the site of origin often cannot be identified, and frequently connection with a synovial structure cannot be demonstrated. The usual picture is that of a seemingly sharply circumscribed tumor which compresses the surrounding tissues into a pseudocapsule; this often gives the erroneous impression of benignity. Most often the color is reported to be a grayish pink, but this varies extensively from one tumor to another and may vary greatly in the same tumor. Firm attachment to a synovial structure at one point, or more, is common and may represent either the site of origin or of invasion. The consistency of a tumor is often varied with moderately firm areas, gelatinous areas and, at times, friable hemorrhagic areas. Often the macroscopic spaces contain a stringy, yellowish liquid. Microscopically, only those tumors which have one or more of the specific synovial features should be considered of synovial nature.

There is no typical history for synovial sarcoma. As a rule the course is long and insidious, often with repeated local excisions of the tumor followed by recurrences; sooner or later, however, the tumor spreads either to the regional nodes or to the lungs, or to both. Pain, disability, and the results of physical examination are so variable as to be unreliable in making the diagnosis. Even macroscopic examination at operation does not reveal anything which can be considered typical; consequently the diagnosis can be made only after microscopic examination of a specimen removed for biopsy.

Synovial sarcoma is a rare tumor. Almost three-fourths of all patients having these tumors are less than 40 years of age and about half of them are less than 30 years of age. The most frequent sites are the knee, foot, thigh, ankle, hand, and elbow, in the order mentioned.

The over-all course tends to be long, and the patient often undergoes repeated local excisions and continues to have recurrences even after many years. The tumor is highly malignant and spreads readily to regional nodes, to the lungs, or to both; consequently the prognosis is poor. Only one of the authors' patients has survived for as long as 5 years or more after operation without recurrence or metastasis.

Stenosis of the Extensor Carpi Ulnaris Tendon Sheath. PER GARSTEN. *Acta chir. scand.*, 1951, 101: 85.

Stenosis of the extensor carpi ulnaris tendon sheath is known as tenosynovitis in the United States. Three case reports are presented; operation was done in each case. The operation consisted of incision and excision of the roof of the ulnar tendon sheath. One patient was discharged as free from symptoms in a month. The second patient was subjected to a longitudinal incision and excision of the roof of the ulnar sheath. This patient was also discharged in a month, free from symptoms. In the third case incision of the roof of the sixth sheath was made. On discharge the patient was free from symptoms, but the time of discharge was not stated.

RICHARD J. BENNETT, JR., M.D.

De Quervain's Disease. BRYAN KEON-COHEN. *J. Bone Surg.*, 1951, 33-B: 96.

In the treatment of this condition conservative measures, including immobilization in plaster of paris, were found useless. In the 13 cases which were analyzed, excision of the thickened sheath resulted in complete cure with no recurrence. General anesthesia and a tourniquet are used. An adequate skin incision is made in the line of the tendons with its center over the tip of the radial styloid. To quote De Quervain: "Care must be taken not to damage the sensitive branches of the radial nerve which run across this area towards the dorsum." A seeker is passed proximally through the canal and the sheath is excised. All tendons present are then identified and the whole sheath excised, including the partition between the two tendons if a second compartment is present.

No doubt the chief predisposing cause of De Quervain's lesion is crowding of the tendons as they pass over the radial styloid process. Angulation at this level in certain positions of the wrist increases the amount of friction between tendon, sheath, and bone. Thus, three lesions arising in women soon after confinement may have been due to continued use of the abducted thumb in holding the baby. In the only bilateral cases in the present series, symptoms on the left side were precipitated by excessive use caused by immobilization of the right wrist after the first operation.

Variations, especially in the tendon of the abductor pollicis longus, are very common. Forty-six cadavers have been examined in the dissecting room and John Hicks, pathologist at Prince Henry's Hospital, Melbourne, has examined 20 postmortem subjects, making a total of 66. In 52 cases (79 per cent), the abductor pollicis longus was represented by two or more tendons. In 62 cases (94 per cent) the tendon of the extensor pollicis brevis was very much the smaller, in 8 cases it was present only as a thin wisp of tendon, but in none was it absent. A single fibro-osseous canal is usual, but in 22 subjects (33⅓%) the extensor pollicis longus occupied a separate compartment.

The operative findings are constant. The tendon sheath is thickened, sometimes for as much as 1½ inches, the greatest thickening being over the styloid process. Here it may be 3 to 4 times the normal thickness of 3 to 4 millimeters. The sheath may be almost cartilaginous in consistency. The synovial surface is often discolored and may have lost its normal sheen.

Filmy adhesions are usually present around and between the tendons, and extend above more than below the styloid process. Occasionally a small excess of fluid is present, especially in patients operated upon shortly after the onset of symptoms.

Microscopically the features are those of a non-specific chronic inflammatory process which varies greatly in degree. The synovial layer is much more cellular than is usual. The lining cells are often numerous and prominent, being polyhedral or columnar in form rather than flattened. There are areas of mucoid change most obvious around the blood vessels. The blood vessels are numerous and thickened, and this thickening is apparent in capillaries as well as in arterioles and venules. It must be noted, however, that blood vessels in and adjacent to synovial membrane are normally thicker than those in other tissues.

The perisynovial fibrous tissue shows increased cellularity and collections of small round cells, mucoid changes, and sometimes small areas of cartilage formation. The small round cell accumulations are almost invariably perivascular in distribution. The adhesions are composed of a fine areolar connective tissue which, in long-standing cases, contains a few blood vessels. In long-standing cases the synovial membrane may also show a great deal more collagenous material than usual.

The extensor pollicis brevis tendon is normally small and may pass through a separate osteofibrous canal.

The abductor pollicis longus is inserted into the radial aspect of the first metacarpal bone and a ridge on the trapezium; it commonly gives off a slip to the abductor pollicis brevis. The extensor pollicis brevis is inserted into the dorsal aspect of the base of the proximal phalanx of the thumb.

C. FRED GOERINGER, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Fixation of Small but Important Bone Fragments with a Hook Plate. WILHELM A. ZUELZER. *J. Bone Surg.*, 1951, 33-A: 430.

In order to simplify the procedure of open reduction, the author devised a hook plate. An ordinary Lane plate was split longitudinally at the midline, and two prongs with short hooks at their ends were obtained. The plate and screws are made of the same metal. After a hairline reduction has been accomplished, the hook plate is applied subperiosteally along the bone and shaped to the contour of the bone. Only the prong-hook part will cover the small fragment, while the hooks themselves will be introduced into holes made with a short Kirschner wire. In fractures of the malleolus, it has been found that one short screw will suffice, as it penetrates only one cortex. For tibial, condylar, and olecranon fractures, two or three screws are advisable.

The hook plate was used successfully in 57 cases, which included 50 fractures of the malleolus and 2 fractures of the lateral condyle of the tibia. In 47 patients with fractures of the medial malleolus, excellent results were obtained and the men were able to resume normal activities within a reasonable amount of time.

One patient had a severely comminuted simple fracture of the olecranon. In this case the proximal fragment was under continuous tension of the triceps muscle. Removing all the fragments would have resulted in a flail elbow joint; therefore, since the small proximal fragment would not allow an intramedullary nail, plate, or wire fixation, the hook plate was applied with the plate portion solidly attached to the healthy cortical bone of the shaft of the ulna. In that position it held the proximal fragment securely and allowed replacement of the comminuted part which, in turn, was held by two additional wires. After 10 weeks this man had motion of from 90 to 130 degrees. C. FRED GOERINGER, M.D.

Architectural Principles of Reconstructive Hand Surgery. J. WILLIAM LITTLER. *Surg. Clin. N. America*, 1951, 31: 463.

Structurally, the hand is divided into two fundamental parts: (1) a relatively fixed portion consisting of the carpus and the second and third metacarpals, and (2) a mobile portion comprising the first, fourth, and fifth metacarpals and phalanges. The fourth and fifth metacarpal bones are limited to a range of motion of 15 degrees for the fourth and 30 degrees for the fifth. The thumb is independent to swing through a wide range of motion. The muscles of the thumb innervated by the median nerve (opponens pollicis and abductor pollicis brevis) abduct and rotate the thumb. They place the thumb in a position where the muscles innervated by the ulnar nerve allow the thumb to take part in the grasping of objects and in its predominant support to the fingers. The functional position of the wrist is 30 degrees of extension, the forearm in a semi-pronated position and the thumb in direct alignment with the radius. The fingers should be semiflexed. The immobilization of the metacarpophalangeal joint in the flexed position allows the collateral ligament to be stretched and the danger of contracture is greatly reduced. In cases of contracture in which the ligaments of the metacarpophalangeal joints make flexion and extension of these joints impossible, excision of the collateral ligaments is indicated.

A capsulotomy is always contraindicated in cases in which paralysis of the intrinsic muscles exists secondary to a median and ulnar nerve disruption. These joints depend for their stability on the intact collateral ligaments in the absence of the intrinsic muscles. And if the collateral ligaments are excised in cases in which the intrinsic muscles are paralyzed the last support of these joints has been irreparably removed. In a capsulotomy particular attention should be paid to the dorsal hood holding the long extensor tendons in place. When the hood is destroyed, the long extensor tendon will slide to the lateral aspect of the metacarpophalangeal joint and thus become completely ineffective. If a scar secondary to a burn is allowed to keep the metacarpophalangeal joints in extension for a prolonged period of time, an irreparable amount of damage will be done to these joints by contracture of the collateral ligaments. It is, therefore, very important to replace the scar by early skin grafting.

Adduction deformity of the thumb can be corrected if not too severe by traction splinting. In more severe cases a Z-plasty operation on the skin on the web may relieve the adduction deformity. If only a superficial portion of the skin is affected a simple skin graft can be used. In case the damage extends further down into the deep structure of the web, a pedicled skin graft may be necessary, or a tubed abdominal flap. During the time of the healing of the skin graft, the thumb must be kept in an abducted position by adequate splinting. In cases in which future mobilization of the thumb cannot be obtained, the thumb is stabilized either by a bone strut between the first and second metacarpal or by fusion of the carpometacarpal joint. An arthrodesis operation of the wrist is often very helpful in restoring the function of the hand. In cases in which an arthrodesis of a certain joint cannot be adequately evaluated preoperatively, temporary immobilization with Kirschner wires may be helpful in establishing an adequate indication.

Destructive wounds of war and bone tumors occasionally cause a loss of bone in the hand. The loss can be overcome by transposition of an adjacent digit or by bone or skin grafting. The loss of the thumb can be overcome by transposition of the index finger or with a bone graft inserted into a tubed pedicled graft. Paralysis of one single motor nerve can easily be compensated by either primary suture and regeneration of the nerve or by the transplantation of tendons.

GEORGE I. REISS, M.D.

Carpectomy. HARRISON L. MCLAUGHLIN and ORREN D. BAAB. *Surg. Clin. N. America*, 1951, 31: 451.

The authors discuss many indications for partial or complete removal of single or multiple carpal bones. Eight indications are listed, the most important of these being severely comminuted or irreducible carpal fractures, dislocations, and fracture dislocations. The technique of removal is discussed and it is suggested that the greatest hazard is that of removal of the wrong carpal bone. The carpal bone should be separated from its soft attachments carefully, gently, and completely by sharp dissection before any attempt is made to remove it.

Thirty-one cases are presented in which total or partial removal of a carpal or carpals was carried out. All of these lesions were traumatic except one.

The article is accompanied by several tables showing the results obtained in 7 cases of complete excision of the navicular, 4 cases in which the proximal navicular fragment was removed, 3 cases in which the lunate and proximal navicular fragments were removed, and 5 cases in which the lunate was removed. The authors emphasize that proper selection of both patients and lesions is very important.

RICHARD J. BENNETT, M.D.

The Treatment of Nonunion of the Humeral Diaphysis (Le traitement des pseudarthroses de la diaphyse humérale). R. MERLE D'AUBIGNÉ and SOLAL. *Rev. orthop.*, Par., 1950, 36: 373.

The authors report about 46 cases of nonunion in the humeral diaphysis: 24 occurred in open war injuries, 6 in accidents, and 16 in closed fractures. Various methods were used: wiring, plating, the Kuntscher nail, intramedullary tibial bone grafting, and the onlay graft with screws. Although the last method was employed successfully in 10 cases of pseudarthrosis of the humerus it requires very long immobilization with ensuing muscle atrophy and joint stiffness.

The most encouraging results were obtained with fixation by means of the Kuntscher nail and the screwed onlay graft. Eighteen of the 19 patients showed union. The advantages are avoidance of angulation of the fragments, and immobilization by an additional bone graft with stimulation of the osteogenetic power, fast union, and no immobilization after 1 month. The use of an iliac graft for that purpose has proved less reliable.

Contraindications were: nonunion, suppuration, and more than 4 previous surgical attempts. Of 10 isolated Kuntscher nailings, 3 resulted in infection. As to nerve involvement, the musculospiral nerve was affected in 11 cases among a total of 49 cases, and required suture or tendon transplantation.

In the 46 cases of humeral pseudarthrosis the author resorted to operation. He introduced the intramedullary nail through the olecranon fossa instead of proximally which causes joint irritation and stiffness. A vertical incision, 10 cm. long, was carried out on the maximally flexed elbow with dissection of the triceps over the olecranon fossa and the use of a guidewire toward an anterior oblique direction. After the nailing and onlay grafting was completed a plaster cast was applied and kept on for 4 weeks, after which time the patient could use the arm freely. The author prefers this combined procedure of intramedullary nailing and tibial onlay grafting to all other procedures and has achieved healing in 90 per cent of the 46 cases of humeral pseuarthrosis.

ERNEST H. BETTMANN, M.D.

Treatment and Results in Congenital Absence of the Fibula (Le traitement des absences congénitales du péroné et ses résultats). T. DUBOST-PERRET. *Rev. orthop.*, Par., 1950, 36: 392.

In view of the 300 cases of congenital absence of the fibula reported in the literature, this condition offers an important therapeutic problem. The author re-examined 16 cases, some of which were followed up over a period of 20 years.

The objective signs are as follows:

1. Absence of the lateral malleolus or posterior and upward displacement in the hypoplastic forms (Volkmann's disease).
2. Pes equino valgus due to posterior and external displacement of the talus with disturbance of the distal epiphyseal structure of the tibia. The restoration of the tibiotalar axis with reduction of the displaced astragalus is the main problem.
3. Subluxation of the astragalocalcaneal junction with medial displacement of the astragalus.
4. Occasional absence of other bones (astragalus, metatarsals).
5. Anterior internal rotation deformity of the tibia.
6. Shortening of the involved extremity (7 or 8 cm.).
7. Accompanying secondary deformities (coxa vara, hip dislocation, deformities of the upper extremity).

The therapeutic procedures are classified as follows:

1. Nonsurgical procedures, manipulation, and cast.
2. Arthrodeses.
3. Osteotomies.
4. Reconstruction operation.

1. The conservative methods have only been employed in 2 cases with doubtful results.

2. The arthrodeses are divided into (a) stabilizing arthrodeses, and (b) plastic arthrodesis with correction of the shortening by the extreme equinus position which produces a digitigrade gait. One case in which an astragalectomy was carried out 44 years previously gave an excellent functional end result; triple arthrodesis with the extreme equinus position is not recommended on account of instability and pain.

3. Osteotomies are recommended as additional procedures for the correction of valgus position.

4. The reconstruction procedures avoid the disadvantage of lost joint motions in the tibiotarsal or subastragalus junctions. They are combined with

lengthening of the Achilles tendon and of the peronei with capsulotomies and soft tissue dissections. Absorption of the bony cartilaginous transplant has been observed.

In conclusion the following procedures are recommended:

After a preliminary and early course of manipulation the combined subastragalotarsal and tibiotarsal arthrodesis is recommended, however, not before 10 years of age.

The correction of the anterior tibial bowing and the shortening is not considered essential.

ERNEST H. BETTMANN, M.D.

Operation for Hammer Toe. IVAR BORG. *Acta chir. scand.*, 1950, 100: 619.

The fact that so many different operations are advised for the treatment of hammer toe would suggest that none of them are too satisfactory. The conservative measures which are usually recommended for children with an as yet unfixed deformity, require a long period of treatment, and the danger of recurrence is always present.

Surgical measures include exarticulation of whole toes, which procedure has become quite unpopular in recent years. The soft tissue operations include tenotomies and tendon-lengthening operations. A group of shortening operations include resection of the proximal phalanx, resection of the head of the proximal phalanx, resection of the interphalangeal joint, and numerous combinations of bone and soft tissue procedures.

The operation suggested by Sjovall is done under local anesthesia, and ambulation is recommended immediately after the operation. The joint causing the hammer toes is approached by a dorsal approach, and by means of bone-cutting forceps, the proximal portion of the middle phalanx and the distal portion of the proximal phalanx are resected. The wound is closed by two steel wire sutures. An arch support is supplied a week or two postoperatively, if it is needed. This procedure was done on 27 patients with very satisfactory results.

GEORGE I. REISS, M.D.

Keller Operation for Hallux Valgus and Hallux Rigidus; An End Result Study. HENRY H. JORDAN and ALEXANDER E. BRODSKY. *Arch. Surg.*, 1951, 62: 586.

The authors report the end results of 161 Keller operations for hallux valgus and hallux rigidus on 100 patients. Resection of two-thirds of the proximal phalanx of the great toe, combined with "exostosectomy" of the head of the first metatarsal, is the method of choice for the treatment of such patients.

The end result was satisfactory to both surgeon and patient in 159, or 98.7 per cent, of the operations. Results are further classified as excellent in 90 per cent, good in 8.7 per cent, and poor in 1.3 per cent. The average period before return to work was five weeks. Full mobility and maximal function did not occur, however, for several months.

The essayists believe the etiologic factor to be the deforming mechanical influence of foot pronation and they present their visualization of this mechanism. The pathology is essentially that of a traumatic osteoarthritis of the first metatarsophalangeal joint.

The technique of the Keller operation consists in the excision of two-thirds of the proximal phalanx of the great toe and removal of the exostosis of the first metatarsal. The importance of removal of at least two-thirds of the phalanx is emphasized. Traction is applied to the toe in a plaster boot postoperatively for approximately 10 days. Foot plates and proper corrective shoes are worn for some 3 months. The necessity for treatment of associated pre-existing and coexisting foot deformities is stressed.

The authors conclude that the Keller operation is their preference in the operative correction of hallux valgus and hallux rigidus. DONALD C. GEIST, M.D.

FRACTURES AND DISLOCATIONS

The Treatment of Pseudarthroses and Difficult Fractures by Means of Double Wire Pressure (Osteopressure-Synthesis) (Die Doppeldrahtosteodrucksynthese zur Behandlung von Pseudarthrosen und schweren Frakturen. O. WUSTMANN. *Chirurg*, 1951, 22: 49.

The author analyzes the two theories of osteogenesis: the old one is based on the specific osteoblastic periosteal hypothesis, while the newer one is based on unspecific mesenchymal metaplasia in which the callus is formed by the organization of a fibrinous mesh from the hematoma; this mesh is invaded by granulation tissue derived from all tissue units around the fracture and absorbs the hematoma after having served as a matrix for the pluripotent mesenchymal tissue; after a gelatinous edematous stage it changes to fibrous callus. The osteoid tissue with a spongeous structure of osteoid trabeculae derives from the collagenic fibers; this is surrounded by swollen mesenchymal cells. The newly formed osteoid structure is then impregnated with calcium by the locally produced phosphoresterase. After the formation of the osteoid and calcification the callus may be differentiated.

According to Krompecher and Wustmann the callus changes under the influence of functional mechanical stimuli to either hyaline cartilage under pressure or to fibrous callus under traction. The pressure-produced cartilaginous callus changes via chondral bone formation to the essential bony callus.

On the basis of these experiences the author has developed a new apparatus for double-wire pressure osteosynthesis in infected or draining nonunion which is illustrated in Figure 1.

After the resection of all fibrous tissue without interference with the periosteum the sclerotic bone is resected, the bone ends are cut in two parallel planes, and the bone marrow is opened. In case of infection counter incisions are made and antibiotics are instilled. Drillholes for the wires are placed 2 cm. from the cut bone surface; the wires have to be

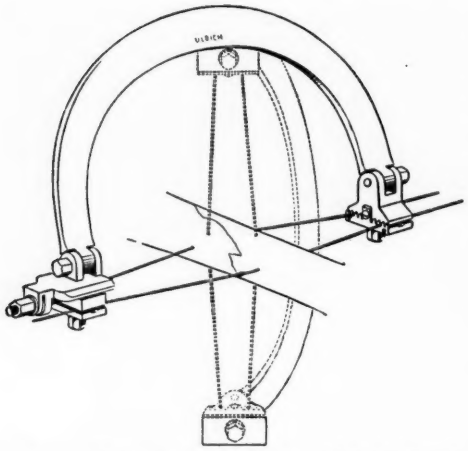

Fig. 1 (Wustmann). Tension bow with double wire synthesis, according to Wustmann.

parallel so that they can be easily incorporated in the double wire pressure bow. After proper positioning the usual plaster cast is applied and kept on for 8 to 12 weeks.

Pseudarthrosis operations in 1,532 cases are reported in the literature; the results were successful in 82 per cent. The author observed bony union in 96 per cent of a series of 156 cases.

ERNEST H. BETTMANN, M.D.

The Monteggia Fracture with Posterior Dislocation of the Radial Head. J. H. PENROSE. *J. Bone Surg.*, 1951, 33-B: 65.

There are two varieties of the fracture-dislocation originally described by Monteggia in 1814 according to whether the head of the radius is dislocated posteriorly or anteriorly. The anterior variety, which is more common, has received a prominent place in all text books on fractures. The posterior variety, however, has received much less attention and there are few references to it in the literature. Most authorities put the incidence of the posterior variety between 10 and 15 per cent, but in a series treated during the last year at the Bristol Royal Infirmary the percentage was greater.

The mechanism of the injury is probably similar to that of the dislocated elbow. Excessive rotation of the forearm plays no part in its production.

There is a fracture of the ulna which occurs about 1 inch distal to the coronoid process, with a separate triangular or quadrilateral fragment which is displaced anteriorly. Several smaller fragments also are usually present on the subcutaneous aspect, but are seldom obvious in the roentgenograph. There is posterior angulation at the site of the fracture, and the distal fragment is displaced toward the radius. (In the more usual anterior type of Monteggia fracture it is the proximal fragment that is displaced toward the radius).

The radial head is dislocated posteriorly and the annular (orbicular) ligament is ruptured, or avulsed with its bony attachment. In 4 of the 7 cases there was a lateral subluxation as well, and in every case there was a fracture of the radial head. In 4 cases of 7 this was a fracture of the anterior margin, which had clearly been sheared off by the capitellum as the dislocation occurred. The detached fragment of the radial head lay anteriorly and could be seen between the radius and ulna. In the 3 other cases there was a fracture through the neck of the radius in addition to the anterior marginal fracture, so that the broken radial head lay free in the joint in two pieces.

Very little information as to the mechanism of the injury was gained from the patients' statements.

Internal fixation of the ulna combined with excision of the whole radial head, or of its detached segment, is suggested as the treatment of choice. The technique of the operation is discussed and the illustrative roentgenographs are most enlightening.

The functional results after operation are excellent, but some slight permanent restriction of movement is to be expected.

Slight restriction of flexion and extension and some limitation of supination have been usual. Pronation and supination seem slightly better in the cases in which the whole radial head has been excised. This may prove to be the better treatment in all cases.

C. FRED GOERINGER, M.D.

Treatment of Compression Fractures of the Vertebrae by Gradual Reposition (Die Behandlung der Wirbelkompressionsbrueche durch allmaehliche Aufrichtung). WOLFGANG SCHUETZ. *Chirurg*, 1951, 22: 112.

The treatment of compression fractures of the vertebrae has been a subject of debate for the last 20 years. Two opposite schools of thought prevail: one attempts to restore normal anatomic conditions by extension and straightening of the compressed fractured vertebrae under local anesthesia; the other foregoes all attempts at reposition and limits the management to functional therapy. Both methods have advantages and drawbacks.

The critics of the method of reposition in one stage state that in a large proportion of cases the injured vertebrae collapse again sooner or later after the intervention, and that impaction of the crushed vertebra is desirable rather than otherwise. In addition, the one stage reposition is not without risk for the spinal cord. A review of 93 cases published in 1940 revealed that, after the Boehler reposition method, pareses occurred in 5 patients who previously had not presented any neurological symptoms. In cases in which an isolated fragment of the posterior wall of the vertebral body is found in the x-ray picture all attempts at reposition are strictly contraindicated.

The author, of the Surgical Department of the University Hospital at Heidelberg, Germany, de-

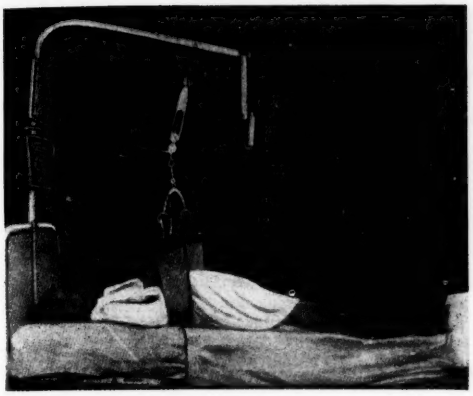

Fig. 1 (Schuetz).

vised a procedure intended to combine the advantages of reposition and functional treatment by very gradual correction of the fracture in a modified Rauchfuss frame.

The patient lies on a hard mattress in supine position. A padded belt, 20 cm. wide and attached to a pulley, passes under the back at the level of the fractured vertebra (Fig. 1). By gradual raising of the belt the lordosis is increased and the gibbus is corrected. After a few days the belt is adjusted so that it is about one hand's breadth above the level of the mattress.

The injured person remains in this frame for 6 weeks and is then put in the prone position, his shoulders being elevated with a hard cushion for 2 to 3 weeks (Fig. 2). On the whole, the patient stays in bed from 8 to 9 weeks. During this entire period physiotherapy is applied, at first to the extremities only but later also to the muscles of the back.

A few days after leaving the bed the patients are able to walk without support and they are started on swimming exercises in the hospital swimming pool immediately. Two weeks later they are discharged for ambulatory treatment with physiotherapy.

Forty-seven patients with compression fractures of the lower dorsal vertebrae were treated by this method. Five of them were admitted with paraplegia; 3 of these died, but in the remaining 2 the paraplegia cleared up during the treatment. In no case was any additional neurological damage seen which could have been caused by the treatment.

The late results were very satisfactory. The author was able to follow up 38 of his patients for years. They all were free of complaints and able to do heavy physical work. WERNER M. SOLMITZ, M.D.

The Surgical Treatment of the Fractured Hip. CHARLES S. NEER II. *Surg. Clin. N. America*, 1951, 31: 499.

This article is based on 310 unselected hip fractures treated on the Fracture Service of the New

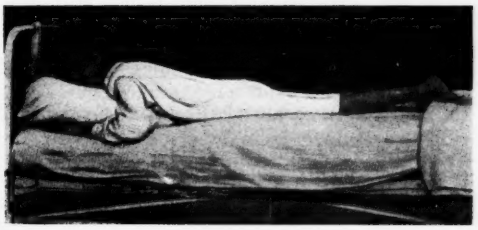

Fig. 2 (Schuetz).

York Orthopedic Columbia Presbyterian Medical Center. There were 143 intracapsular fractures and 167 extracapsular fractures. The average age of the patients ranged from 59 to 71 years of age.

The intracapsular fractures consisted of a type I, impacted valgus type, a type II, a midneck type (varus), and a type III, a vertical subcapital type (varus). Nonunion occurred most often in the type III. Avascular necrosis occurred quite often in types II and III. The author found that in cases of extracapsular fractures the mortality rate was high and a stormy postoperative course was quite often observed. The comminuted type of fractures caused varus deformities with significant degrees of shortening of the extremity. Avascular necrosis occurred only in types II and III of the intracapsular fractures because the important blood vessels which pass through the affected capsules were disrupted.

There are three main sources of the blood supply: (1) intramedullary vessels which for the most part do not cross the level where the epiphyseal plane has been located previously; (2) the artery of the ligamentum teres which varies with each individual; and (3) capsular vessels located particularly on the posterior aspect of the head and neck.

The systemic effect of the fracture of the neck depends on the soft tissue injury and the pain. It is, therefore, very important to institute treatment as fast as possible. A sprained hip in the elderly patient must be treated as a fracture until proved otherwise. The fractures most often overlooked are the impacted valgus of the neck and the nondisplaced intertrochanteric fracture. If undiagnosed these fractures may fall apart and give rise to a considerable number of complications. The adequate treatment of fractures of the femoral neck includes a minimal preoperative delay, stable reduction, a rigid internal fixation, and a definite program of rehabilitation both in the postoperative and convalescent period.

The question of when to allow full weight-bearing on the affected leg does not have an unfailing answer because the decision of whether union is present or not is not always made satisfactorily by means of the roentgenogram.

The type I, impacted valgus type, fracture is treated by the Smith-Petersen nailing. In the type 2, midneck (varus), fracture, reduction is carried out

under direct visualization and the head is well balanced upon the neck before the introduction of the nail. The most difficult problem in fracture surgery is the type III, vertical subcapital (varus), fracture. Even if adequate reduction is carried out, the head will have a tendency to slip downward. Primary osteotomy is, therefore, indicated in this type of fracture. The nondisplaced and stable displaced extracapsular fractures are treated by internal fixation and usually give satisfactory results. The unstable extracapsular fracture in very often the cause of the shortening of the affected extremity. It was found that 1 of 4 patients died even under the most ideal conditions of treatment.

GEORGE I. REISS, M.D.

Fractures of the Neck of the Femur in Children. A Clinical Study. GUILLERMO ALLENDE and LUIS G. LEZAMA. *J. Bone Surg.*, 1951, 33-A: 387.

The authors report 8 cases of fracture of the neck of the femur in children ranging from 3 to 14 years of age. Each was the result of severe trauma.

The direction of the fracture line is important, and should be carefully checked after reduction. When the Pauwels angle was less than 50 degrees the patients responded well to simple reduction with the Whitman technique. In the 3 cases in which the angle of inclination of the fracture line was greater than 50 degrees, surgical intervention was indicated. When the displacement was great and the fracture not a recent one, it was better to use a fibular graft with intertrochanteric osteotomy. The authors believe that when the Pauwels angle is greater than 50 degrees, a prompt osteotomy is fundamental to solid bony union. Two of the 8 patients had aseptic necrosis.

DANIEL H. LEVINTHAL, M.D.

Intramedullary Nailing in Recent Fractures of the Femoral Shaft. G. C. LLOYD-ROBERTS. *Lancet*, Lond., 1951, 260: 711.

The author treated 37 patients with fractures of the femoral shaft. In 17 the operation was performed for malunion, non-union, or limb shortening. In the remaining 20 patients nailing was used as the primary definitive treatment.

The method used involves exposure of the fracture and insertion of the nail under direct vision.

Nailing is regarded as the method of choice for fractures between and including the subtrochanteric region and the junction of the middle and lower thirds of the shaft, unless they are extensively comminuted, or other factors preclude operation.

Failure to maintain reduction in low fractures is due to two factors: (1) the short length of nail that can be passed distal to the fracture cannot prevent angulation and may lose contact with the distal fragment if any upward riding of the nail as a whole takes place; and (2) the disproportion between the diameter of the nail and the flared out medullary cavity prevents firm contact between the nail and cortical bone in a circumferential plane at the level of the fracture.

Fractures of the femoral shaft complicated by fracture of the tibia and fibula on the same side are best treated by intramedullary nailing combined with internal fixation of the tibial fracture. An obstinately stiff knee need not be the price which the patient must pay for a reconstructed limb as the postoperative regime does not involve restriction of movement.

The average time between injury and the removal of all protection was 17.2 weeks. This compares favorably with the 23 weeks required to reach the same stage in a control group of femoral fractures treated without internal fixation.

In so far as complications were concerned, sepsis occurred in the buttock wound in 1 case.

A man with a fracture of the upper third of the femur was found to have bent the nail during the period of partial weight bearing. He was one of the early cases (1945), and it was evident that the nail used was too short. The angulation of the femur was not gross, and when the patient was last seen 5 years later he had 1 inch of shortening but a full range of movement. He is following his prewar trade as a bricklayer.

A man was discharged from the hospital bearing partial weight 6 weeks after the nailing of a transverse middle third fracture. Next day he fell onto a concrete floor and bent the nail at the site of fracture. He was readmitted and the alignment was restored by traction. This was possible because the distal fragment could be moved on the pin in the splayed out lower end of the bone. The final result is excellent, but the pin will probably have to be left *in situ*.

The nail should be removed when firm consolidation has taken place. This can be done very easily through a small incision over the buttock and with an extractor which resembles a hook and fits the slot made in the end of the nail for this purpose. The nail is removed because a bursa often forms around the protruding tip and causes pain when the patient sits down, and because the permanent retention of so large a piece of metal within the medulla may have its own dangers.

C. FRED GOERINGER, M.D.

Fractures of the Shafts of Both Bones of the Lower Leg. PRESTON A. WADE. *Surg. Clin. N. America*, 1951, 31: 531.

Transverse fractures of the shafts of the tibia and fibula may be handled easily by immediate reduction and application of plaster splints. Oblique and spiral fractures, on the other hand, may tax the ingenuity of the surgeon. Delayed healing and nonunion are common. It is important to x-ray the entire length of both bones together with adjacent joints, otherwise multiple fractures may be overlooked. Because of the subcutaneous position of the bones of the leg, fractures are apt to be compounded. Despite the tendency in recent years to perform open operations, it should be emphasized that a large percentage of fractures of both bones of the lower extremity may

be more simply and safely treated by manual manipulation and application of proper plaster splints. In children especially it is rarely indicated that open operation be performed. Internal fixation with nails, screws, or plates should not be used. While even slight angulation is to be avoided, moderate displacement with shortening may be acceptable in children. The author discusses four general types of leg fractures as follows:

1. Transverse fractures of the shafts without displacement.
2. Transverse fractures of the shafts which need reduction but in which reduction may be maintained by plaster immobilization.
3. Unstable fractures of the shafts, oblique or spiral, in which reduction cannot be maintained by plaster alone.
4. Compound fractures.

In the case of transverse fractures without displacement, plaster should be applied from beyond the toes to a point as high on the thigh as is consistent with the patients comfort, i.e., within 3 inches of the groin, and with the knee flexed to 135 degrees. It is probably wiser to use padding, especially if the patient cannot be under close observation. After 2 or 3 weeks the knee may be extended to 170 degrees, and later a walking iron is applied. Quadriceps exercises should be instituted immediately. Immobilization is maintained until there is solid clinical union, frequently for 10 or 12 weeks. Following removal of the cast, physiotherapy is employed to hasten return of knee and ankle function. Application of a Unna's paste boot or an ace bandage will help greatly to obviate swelling.

Where reduction of transverse fractures is required, it may be accomplished with local anesthesia. If there has been considerable trauma to soft tissues it may be necessary to apply only a posterior splint initially. Completion of the circular plaster may then be carried out in from 48 to 72 hours.

In patients with unstable fractures of both bones, skeletal traction by means of a Kirschner wire or Steinmann pin through the os calcis is probably the oldest and most popular treatment. The limb may be supported in a Thomas splint with Pearson extension. If it is decided that continuous traction should be used, then it is wiser to use either local or general anesthesia at the time traction is applied and to reduce the fracture accurately and use the continuous traction as a means of maintaining the reduction. One should not expect weight alone to correct displacement and over-riding.

The method of multiple pin fixation was popularized just before, and during World War II. After reduction of the fracture, the limb is encased in plaster, incorporating the pins in the plaster and thereby holding the fragments in position. Advocates of internal fixation state that danger of infection is less when open operation is done than when multiple pin fixation is used; also, there is danger of distraction with certain types of external fixation apparatus.

When two pins only are used, one in each fragment, and circular plaster is applied to incorporate the pins, it may not be necessary to extend the cast beyond the knee. The knee is not immobilized, ambulation is permitted at a relatively early date, and in some cases weight-bearing may be instituted much earlier than with traction methods.

If open operation is required, "use as little fixation metal as possible, but use as much as is necessary to accomplish firm fixation." One or two screws may be sufficient. In multiple fractures, it may be necessary to use a long plate of six or eight holes. The plate should be placed on the lateral aspect of the tibia beneath the anterior tibial muscle. Because of the shape of the medullary cavity of the tibia, the intramedullary nail does not adequately support the fragments and usually is not employed in the leg. All open fractures are emergencies and must be operated upon immediately except in the rare case in which contraindication exists. Débridement must be performed, preferably under ideal operating room conditions. Provided an open wound has been cared for promptly and adequately and has not been badly contaminated, it may be closed primarily. Primary closure should be accomplished with a minimum of tension, and not in layers. Adequate débridement cannot be accomplished through a tiny puncture wound. After excision of dead and dying tissue and copious lavage of the wound, vital structures such as blood vessels, nerves, and tendons should be repaired. The fracture may then be reduced and treated. Secondary closure in grossly contaminated cases may be accomplished after 4 or 5 days, even in the presence of plates or screws. It is better to have firm fixation of the fragments rather than mobility of the fragments in the presence of infection.

KENNETH SHERMAN, M.D.

Fractures of the Anterior Process of the Calcaneus.
MOSES GELLMAN. *J. Bone Surg.*, 1951, 33-A; 382.

Sudden adduction of the fore part of the foot at the lateral mediotarsal joint, especially in equinus, exerts strong tension upon the calcaneonavicular portion of the bifurcate ligament which attaches to the anterior process of the calcaneus. There is immediate pain on the outer aspect of the midportion of the foot, and considerable pain on weight-bearing. Tenderness is localized to an area nearly ½ inch in diameter on the dorsal surface of the calcaneocuboid joint, which is found about 1½ inches forward and slightly below the tip of the external malleolus. There is pain and spasm on attempting adduction. Ecchymosis and swelling follow. Anteroposterior and lateral roentgenograms are not sufficient. Oblique views at several different angles must be made in order to separate the shadow of the anterior process of the os calcis from that of the front and under surfaces of the talus.

A simple below-the-knee cast gives comfort in the more severe cases, but an elastic bandage is sufficient in the less severe ones. No weight-bearing is permitted for 4 weeks, when physical therapy is begun. The

disability is likely to last longer than anticipated; accordingly, it is prudent to warn patients at the outset that their convalescence will be slow. The final outcome, however, will generally be regarded as satisfactory. DANIEL H. LEVINTHAL, M.D.

ORTHOPEDICS IN GENERAL

Effects of Exercise on Adult Articular Cartilage; An Experimental Study on Guinea Pigs with Reference to the Continuous Regeneration of Adult Cartilage. JOSEF SÄÄF. *Acta orthop. scand.*, 1950, Supp. 7.

This investigation was carried out in order to study the manner in which the normal adult articular cartilage reacts when influenced by physiologically increased function.

Approximately 140 male guinea pigs were used in the experiments, which were started when the animals were 11½ months old. All of the guinea pigs belonged to the same strain originating in 1934 from 20 animals.

The animals lived in ordinary cages of the same size. Those selected for exercise had to run 1,000 meters per day in a special apparatus. After every twentieth day of exercise the animals in one subgroup were killed simultaneously with animals which were not exercised.

After the animals were killed their shoulder joints were dissected out so rapidly that they could be put into fixing fluid within 10 minutes. After histotechnical treatment of the shoulder joints, the articular cartilages of the humerus and the scapula were examined microscopically within the weight-bearing parts. The three zones of the uncalcified cartilage, viz., the superficial tangential, the transitional, and the rapid zone, were examined separately.

The average volume of the cells of the humeral cartilage revealed an increase in all three zones in connection with the exercise. The size of the cells in all zones of the humeral cartilage grew larger during the course of the exercise and the proportion between the cellular and intercellular substance was temporarily changed in the transitional zones in favor of the cellular one.

The thickness of the uncalcified cartilage of the humerus was practically constant in the various exercised groups, and was the same as in the control animals.

Consequently, in this investigation it was proved that the tissue of the adult articular cartilage reacts to increased functioning of the joint. In the present study this reaction appeared in the form of varying degrees of structural modifications within the cartilage during the exercise without definite change in its thickness.

Roux and Fick were of the opinion that the "kneading" of the articular cartilage in the functioning of a joint has an immediate, stimulating effect on the formation of the cartilage.

In the actual investigation there was no definite increase in thickness of the uncalcified cartilage in the exercised animals. This implies that the wear and tear and the continuous degeneration kept pace with each other. It would, however, be too rash to conclude that this is always the case.

C. FRED GOERINGER, M.D.

A Rare Lipoidosis of Orthopedic Interest: Cerebrotendinous Form of Generalized Cholesterosis (Una rara lipoidosi di interesse ortopedico: forma cerebro-tendinea della colesterinosi generalizzata). D. VINDITTI. *Chir. org. movim.*, 1950, 34: 429.

The cerebrotendinous form of generalized cholesterosis is a rare form of lipoidosis, but on account of the organs it affects, it becomes of orthopedic interest. Since it involves most often the large tendons of the body (Achilles, peroneal, triceps brachii, biceps brachii, quadriceps) and produces neurologic changes, the organs of motion are seriously affected.

The case histories of 2 of the author's patients suffering from this disease are presented in detail. The patients were sisters, 28 and 24 years of age, respectively, married, and daughters of the same parents. No other member of the family, in direct line or collateral line, had ever been affected by this disease.

The elder sister first noticed a progressively increasing, symmetrical, practically painless swelling of both Achilles tendons at the age of 15 years. Five years later, she noticed cutaneous nodules in the region of the tibial tuberosities and one nodule on the right elbow. She also developed swellings over the tendons of the triceps brachii. After puberty the patient became depressed and easily irritated. At this time she began to notice a loss of vision. She was found to have bilateral juvenile cataracts and these were removed. She had always complained of weakness.

The younger sister had noticed for 4 years a gradually increasing swelling of both Achilles tendons. She, too, had begun to suffer loss of vision. She was found to have bilateral juvenile cataracts.

From his examinations, the author found that these patients presented practically all the characteristics of the cerebrotendinous form of lipoidosis. These include disturbance of the endocrine system and dystrophy, retarded mental development, cerebellar ataxia and cranial nerve involvement as in paralysis of the lips, tongue, and larynx.

Diffuse intratendinous xanthomas appear early in the disease, involving the large tendons of the lower extremity of the body, especially the Achilles tendon, and later the tendons of the upper extremity.

Bilateral juvenile cataracts develop.

Xanthomas appear in the skin, although they are far rarer than the tumors of the tendons.

There is an absence of structural changes in the skeletal system.

The internal organs and the lymphatic system are unaffected.

The course of the disease is chronic and it occurs in members of the same family.

Changes which had taken place in the tendons were revealed by macroscopic and microscopic stud-

ies of material taken from the patients at biopsy. Macroscopically, the tendon mass appeared to be a yellowish ochre color and the volume of the tendon was about four times that of the normal tendon. The calcaneal extremity of the tendon was swollen in a fusiform shape. When the tumor mass was cut, the sections showed a uniform yellow color and preservation of the tendon structure. The consistency of the tendon was more dense than that of the normal tendon.

Histological sections prepared from the tendon mass showed the tendon fibers to be dissociated from one another by delicate cells and crystalline cholesterol. There was a noticeable infiltration of lymphocytes and giant cells containing fat. In areas where there were no cholesterol deposits, the tendon tissue was granular and showed neutral fat deposits.

The cutaneous nodules were examined histologically and found to contain delicate cells separated by fibrous connective tissue masses, but there were no deposits of cholesterol.

Both patients developed cataracts. Those occurring in the elder sister had been removed before the author had seen her. The cataracts of the younger sister were removed and found to contain cholesterol deposits.

Radiologically, the bones were unaffected.

Histochemical studies were carried out to determine the amount of cholesterol in the tendon mass. The total fat substance was found to be 30 per cent of the dry residue. The percentage of cholesterol was 10.94 per cent, of which 6.15 per cent was free cholesterol, 4.79 per cent combined cholesterol, and 1 per cent phospholipids.

The chief clinical characteristics of this disease are shown by nervous, tendinous, and ocular manifestations.

The nervous manifestations consist of cerebellar disturbance, the pareticospastic syndrome, and, finally, chronic bulbar symptoms.

The tendinous manifestations appear as progressively symmetrical swellings of the larger tendons of the lower extremity chiefly. The tendons of the upper extremity and tendons small in size are less commonly affected.

The internal organs and bones are unaffected.

The disease has a familial character. Its course is remarkably slow and is protracted into adult life.

All manifestations of the disease are based on a disturbance of the cholesterol metabolism. The anatomical picture is characterized by the accumulation in the affected tissues of a lipoid mixture in which free cholesterol is demonstrated in great prevalence over combined cholesterol. The disposition of cholesterol is both intracellular and extracellular.

On account of the tissues and organs which are involved, the disease is of orthopedic interest.

BLACKWELL MARKHAM, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

The Growth of Vena Cava and Aorta Grafts; An Experimental Study. JULIAN JOHNSON, CHARLES K. KIRBY, MARK W. ALLAM, and WILLIAM HAGAN. *Surgery*, 1951, 29: 726.

It has been shown that all layers of vena cava grafts used to bridge defects of the aorta in the same dog become infiltrated with fibroblasts, and that thickening with fibrous tissue results. Some dilatation of the vein grafts usually occurs, and it has been postulated that the degree of dilatation is limited by fibrosis. If this is true, limitation of growth might also be expected. In grafting of the aorta from one dog to another there is invasion of the graft with host fibroblasts. In some instances intimal sclerosis and calcification have been observed.

The authors report the results of experiments concerning the growth of vena cava grafts to the aorta of the same pig (vena cava autografts), of aorta grafts to the aorta of the same pig (aorta autografts), of aorta grafts to the aorta of other pigs (aorta isografts), and the effects on growth of the fibroplasia occurring in autografts, as well as the changes due to tissue incompatibility in isografts.

It was seen that the growth of vena cava and aorta autografts in pigs equalled that of the aorta in which the grafts were placed. The incidence of thrombosis in aorta isografts was high, but the growth was equally good when thrombosis did not occur.

Fibroplasia and other changes which may occur in autografts did not limit growth, at least not rapid growth.

It was concluded that the results are not necessarily applicable to children, in whom the growth period is much longer and in whom slower growth might provide time for the development of mature connective tissue which might limit growth. The high incidence of thrombosis in the isografts suggests that changes due to tissue incompatibility may seriously limit the usefulness of isografts when growth of the graft is required for success.

STEPHEN A. ZIEMAN, M.D.

The Resection of the Bifurcation of the Aorta in One Stage for Thrombosis (La résection du carrefour aortique en un temps pour thrombose). J. SAUTOT. *Lyon chir.*, 1951, 46: 206.

The author describes in some detail the technique of one-stage resection of the bifurcation of the aorta for chronic thrombosis. Arteriography is done to show the collateral circulation, which must be adequate. The transperitoneal approach is used. The clot is removed to prevent embolization before ligation of the vessels.

Two cases are reported. One of the patients made a satisfactory recovery but did not have immediate relief from his symptoms. He was symptom-free after 3 months. The second patient died on the fifth postoperative day with an ascending thrombosis of the aorta. This patient had involvement up to the renal arteries and the collateral circulation showed this on the arteriogram.

When the arteriogram is unsatisfactory or the condition of the patient does not permit the operation, removal of the first and second lumbar sympathetic ganglia is recommended.

THOMAS C. DOUGLASS, M.D.

Surgical Treatment of Portal Hypertension by Portacaval Anastomosis (Sur le traitement chirurgical de l'hypertension portale par les anastomoses porto-caves). JEAN AUVERT. *J. chir. Par.*, 1951, 67: 26.

Of the various methods which have been recommended in the literature (L. Rousselot, *J. Am. M. Ass.*, 1949, 140: 282) for shunting the portal blood into the general circulation (vena cava inferior), the author describes in detail the technique and management of two: the splenorenal terminolateral venous anastomosis, and the terminolateral, or laterolateral, venous anastomosis between the portal vein and the inferior vena cava.

The abdominal incision is made along a curved line extending from the ninth rib on the right side to the analogous point on the left, and passing a finger's breadth cephalad to the umbilicus. If the anastomosis is to be between the portal and the caval veins directly, the incision on the right side is extended along the ninth rib, which is excised, onto the chest, thus opening the chest cavity and permitting the upwards rotation and displacement of the liver, and wide exposure of the operative field; if the anastomosis is to be between the splenic and renal veins, the incision is extended in an analogous manner on the left.

As soon as the abdomen is opened and the veins exposed, manometric readings of the blood pressures are made for all the principal vessels of the portal system by direct insertion of the manometric needle into the venous lumen. On occasion a simultaneous phlebography is done by injecting a shadow-casting preparation (70 per cent solution of diiodone) by means of a syringe attached to a three-way valve intercalated into the manometric system, through the manometric needle itself.

Although the author does not give any case reports, he does state that these shunting operations are being done in various services in the hospitals of Paris, Lyons, and Bordeaux, especially since the recent encouraging reports coming from America, and that a report on the indications for the operation and on the results to be expected should now be justified.

The author considers that the portacaval shunt is at present the best treatment known for portal

hypertension; in fact it is the only method available for the surgeon who inadvertently injures the portal vein and is unable to repair the injury. Simple ligation of the portal vein will not be supported by the patient, except in those cases in which stenosis, or tumor pressure, has already led to the formation of an adequate collateral circulation. Whether this collateral circulation is adequate is judged during the manometric determinations by compressing the portal vein above the point of perforation by the manometric needle; if the pressure from below builds up rapidly the patient will not support total interruption of the portal blood stream.

For most cases the author prefers the direct anastomosis between the portal vein and the vena cava inferior, since the other forms are only too apt to prove insufficient. JOHN W. BRENNAN, M. D.

The Effect of Vasodilator Drugs on the Circulation of the Extremities. DANIEL C. ELKIN and F. W. COOPER, JR. *Surgery*, 1951, 29: 323.

In an effort to simulate the pathologic state, vasospasm was induced in normal individuals by cooling the room to 68° F. After a period of 30 minutes, plethysmographic responses were studied and skin surface temperatures were determined. The individuals were then given either from 32 to 64 mgm. of papaverine, 50 mgm. of nicotinic acid, or 25 mgm. of priscoline. Observations were carried out thereafter for a period of 1 hour. Papaverine and nicotinic acid did not significantly change either the skin surface temperatures in the digits or the plethysmographic responses. Priscoline, however, effected an increase in these responses, but one which was not nearly so great as that produced by posterior tibial nerve block or sympathectomy.

In patients with organic obliteration of the arteries as a result of Buerger's disease, arteriosclerosis, or embolism, or with actual ligation, in which one extremity remained normal, the same methods of study were carried out. Responses from the normal, as well as from the diseased, extremity were obtained for control study purposes. It was found in this group of individuals that while the blood flow increased in the normal extremity, as reflected by increases in the skin surface temperatures, volumes of the digits, and pulse volumes, in the diseased extremity there was either no significant change or the blood flow was reduced.

The patient with arterial insufficiency of an organic nature in an extremity is concerned primarily with keeping the envelope of the body intact. Inability to walk, while incapacitating, is a matter only of displeasure; however, ulcerations in the skin, gangrene, or neuritic disturbances result in severe pain and inability to lead any type of comfortable existence. In the treatment of these individuals the first concern is to maintain viability of the skin, and the second is to increase the blood flow in the muscles. Since autonomic activity in the extremity can be influenced, the method of selective denervation has gained wide popularity. With selective denervation of the extremity, a great deal is accomplished if trophic changes can be prevented or arrested and the healing of wounds or ulcerations can be effected. Benefit to the muscle is also a frequently observed phenomenon. It is obvious that in organic arterial disease, localized vasodilatation only should be employed. Generalized vasodilatation may be not only ineffective, but definitely harmful.

It is hoped that, in the future, selective denervation can be achieved by chemical means, by direct intra-arterial injection of some of the vasodilator compounds. If, through intra-arterial administration of these compounds, the effect can be limited to a desired area and to a lesser degree to other areas, the same therapeutic effects would be achieved as those brought about through sympathectomy.

In the treatment of primarily vasospastic conditions, such as posttraumatic vasospastic states or Raynaud's disease, the problem is one of quite a different nature. With the actual caliber of the peripheral vessels remaining unobstructed, there is need only to decrease the sensitivity of the peripheral vessels to vasomotor control. The administration of vasodilator compounds prior to the reception of the vasomotor stimuli has produced marked clinical improvement. This same improvement has been noted as a result of decreased sympathetic outflow as produced by sedation with barbiturates, introduction to a warm climate, emotional rehabilitation through personal readjustments or hormone administration, or other similar therapy. In certain vasospastic conditions it is believed that these compounds may have a valuable function, but only in such conditions should these be used.

BENJAMIN GOLDMAN, M.D.

Division of the Popliteal Vein in Deep Venous Insufficiency of the Lower Extremities. G. DE TAKATS and G. W. GRAUPNER. *Surgery*, 1951, 29: 342.

A large number of patients are afflicted with postphlebitic sequelae of the lower extremities consisting of pain, edema, induration, dermatitis, and ulceration. The pain may be causalgic, neuritic, or "bursting," the last type being characteristic of deep venous insufficiency which itself may be one of three types: (1) congenital, occurring mostly in young girls, without evidence of thrombosis, who have extensive and atypical varicosities; (2) deep venous obstruction due to thrombosis in which the thrombus recanalizes; and (3) phlebosclerosis of the popliteal vein, in which the vein is thickened and sclerotic without evidence of thrombosis; the valves cannot close and act as a cause of postural venous hypertension.

Operations on the common or superficial femoral and saphenous veins have been suggested for the above conditions, but the authors agree with Bauer that they are of little help and may cause harm. The authors advocate ligation of the popliteal vein in selected cases only: namely, those that exhibit visible varicosities on the calf which do not collapse in the erect position in spite of a tourniquet above

the knee; varicosities which collapse on rapid flexions and extensions of the knee with a tourniquet above the knee; and varicosities which rapidly refill on cessation of exercise with the tourniquet in place.

In a series of 100 patients who had varicosities, the diagnosis of postphlebitic syndrome was made in 46 and only 10 of these were subjected to ligation of the popliteal vein. Seven of the 10 benefited from the procedure. Other patients with deep venous insufficiency who did not fall into the small class described benefited from high saphenous ligation and stripping which relieved the discomfort, allowed ulcers to heal, and decreased edema.

Ten illustrative case histories are appended.

ALBERT M. SCHWARTZ, M.D.

Acute Massive Venous Occlusion of the Lower Extremities. J. ROSS VEAL, THOMAS J. DUGAN, WILLIAM L. JAMISON, and RICHARD S. BAUERSFELD. *Surgery*, 1951, 29: 355.

Extensive thrombosis of the veins of the lower extremity occasionally disturbs the entire circulation of the limb with gangrene of the toes and feet, which presents a grave prognosis for life and limb. The cardinal symptoms are acute onset with extreme pain, cyanosis, venous congestion, edema, and circulatory failure of the involved extremities. The essential pathology is an acute and almost total obstruction of the venous bed. It has been called "blue thrombophlebitis," "gangrene of venous origin," and "gangrene from arterial spasm in phlebitis." The authors believe it should be called "acute massive venous occlusion." DeBakey and Ochsner collected a number of cases from the literature and presented 2 of their own with thorough discussion of the entire picture in 1949. They thought that vasospasm was responsible for the pain; however, the fact that the process may continue to progress to actual gangrene in spite of antivasospastic measures seems to indicate that this was not the primary factor.

The authors present 11 cases of acute massive venous occlusion, including 2 of postpartum thrombophlebitis, 1 case of acute massive chemical thrombosis following the injection of 10 c.c. of sclerosing solution into the vein, 3 cases of phlebothrombosis with shifting thrombus, and 5 cases following ligation of the vena cava. One case history of ligation of the vena cava for thrombosis of the deep veins of the left lower extremity which extended to the vena cava and caused pulmonary emboli is outlined. Immediately after the operation, it was noted that the veins of the normal right leg and foot were markedly engorged with cyanosis of the toes and feet. The pulses were intact. Fifteen minutes after leaving the operating room the patient began to scream with intense pain in the entire right lower limb. The superficial veins were markedly distended and the extremity began to swell rapidly. Petechial hemorrhages appeared. The pain was so intense that it was difficult to keep the patient in bed. A lumbar block was performed with some relief, but the cyanosis and swelling continued. The patient's blood pressure dropped, and the pulse became rapid. The leg and thigh were elevated to about 60 degrees and rapid exercise of the foot and leg was initiated with steady improvement. The pain subsided, the cyanosis disappeared, and the veins became less swollen. Blood transfusion restored the circulation.

The 11 cases exhibited the cardinal signs and symptoms of the condition; namely, acute, sudden excruciating pain, which made the limb feel as if it were being blown up; swelling; venous congestion; cyanosis or a mottled deep grey color; petechial hemorrhages; drop in the skin temperature; and palpable pulses.

Experimental venous occlusion was studied in the hind legs and mesenteries of dogs and the results are reported.

Therapy consisted of high elevation of the involved extremity (60 to 75 degree angle) with rapid extension and flexion of the foot, leg, and thigh. This contracts and relaxes the muscles of the leg and thigh and expresses the venous blood forward into the veins of the groin and lower abdomen. As soon as the blood begins to flow through the extremity, the acute symptoms subside. The exercise should be continued with short intervals of rest until the limb can be allowed to remain at a high level on pillows without showing venous engorgement. It should be continued at regular intervals each day. The elevation is continued until all swelling has subsided and then elastic stockings should be prescribed for as long as the edema persists. Anticoagulant therapy does not remove the obstruction and should not be used until the blood flow has been re-established.

Typical case histories and informative illustrations are included in the article.

ALBERT M. SCHWARTZ, M.D.

Phlebography of the Limbs by the Intraosseous Method (La flebografia degli arti per via ossea.) G. ENRIA and R. FERRERO. *Chirurgia*, Milano, 1950, 5: 289.

A series of experiments was carried out by the authors to obtain information concerning the intraosseous injection of modern preparations of organic iodine for angiography and to investigate the nature and extent of the lesions of bone caused by the injections.

At the same time the authors studied by means of complementary roentgenological research, the method of passage of the opaque medium from the bone to the vessels of the limbs.

The rapid passage of the opaque medium from the medulla of the bone into the general circulation was confirmed by serial roentgenograms. These films demonstrated in every case that after 2 seconds half of the contrast medium had left the bone, entering into the principal vessels of the limb. The filling of the vessels appeared complete and at the end of the injection only a little of the opaque liquid remained in the bone.

Following the injection, a large number of the medullary venous sinuses were ruptured. The rup-

ture of the venous sinuses formed traumatic cavities, visible roentgenologically as opaque macules.

Histological studies were carried out to determine the cause of the rapid passage of the contrast medium from the medulla of the bone to the general circulation.

Experiments were performed on adult dogs of medium size. Ten cubic centimeters of the contrast medium (joduron 70%) were injected into the diaphysis and epiphysis of the long bones under strict asepsis, a sternal puncture needle being used for the injection.

Some of the animals were sacrificed at 2, 15, and 30 day intervals after the beginning of the experiments. The bones injected were removed and fixed in 10 per cent formalin.

After decalcification, sections were taken from the bone at three sites: (1) at the point of injection of the diaphysis, (2) at a point in the diaphysis farther from the point of injection, and (3) at a point in the epiphysis.

On the second day after the injection, histological sections showed congestion and hemorrhage in the medulla of the epiphysis and of the diaphysis at the point of injection of the opaque medium. There was no evidence of damage to the bony lamellae.

On the fifteenth day after injection, there appeared important osteopoietic phenomena in the periosteum. In the spongy area of the medulla, dense layers of newly formed bone were present. Calcium deposits had been laid down.

On the thirtieth day after the injection, the trabeculae in the spongy area showed an advanced evolution of bony tissue. The medulla was filled with fibrous tissue with congested vessels. The periosteum formed a sheath of fibrous tissue with active proliferation of new bony trabeculae. The outline of the peripheral haversian canals and the periosteal membrane was not clear, while the systems of lamellar deposits parallel to the bony axis were lacking.

From their experiments, the authors conclude that the rapid absorption of the contrast medium from the bone into the general circulation is due to the presence of a very rich vascular connection between the venous circulation of the bone and the general circulation. In their opinion, this fully justifies this method of introducing the contrast medium and explains its success in practical therapeutics and diagnosis.

They discount the possibility of gross macroscopic lesions due to the injection of organic iodine for phlebography.

The basic lesions produced by the injection can be summed up as a condition of intense hyperemia with hemorrhage and reaction of an inflammatory type localized around the vessel walls.

These inflammatory infiltrations are probably responsible for the phenomenon of erosion which gives the appearance of areas of softening in the dense bone.

Evidently, it is the traumatic action of the liquid injected with a certain pressure into rigid surroundings that causes the laceration of the small venous sinuses and the prompt absorption of the opaque medium.

After the inflammatory period, the osteoblasts undergo a process of rebuilding, giving rise to intricate bony trabeculae. The rich blood supply aids in the process of ossification of the fibrous area. Much the same process takes place as in the repair of fractures.

Notwithstanding the fact that the authors used a relatively large (10 c.c.) quantity of a highly concentrated medium (70%), they do not consider the changes produced in the bone of any great concern.

They recommend that in clinical practice an opaque medium of from 30 to 35 per cent concentration be used in roentgen examination, and encourage further development of this method.

BLACKWELL MARKHAM, M.D.

MISCELLANEOUS

New Theoretical and Practical Knowledge on Thrombosis and Hemostasis. (Nouvelles connaissances théoriques et pratiques sur la thrombose et l'hémostase.) A. WINTERSTEIN. *Bruxelles méd.*, 1951, 31: 69.

On the basis of available information, the author reviews the present status of the complex mechanism of blood coagulation and the various inhibiting mechanisms.

The use of thrombin topically is discussed; also the use of a soluble gelatin sponge (developed in Switzerland) in conjunction with thrombin. The intravenous use of thrombin is regarded as a two-edged sword, producing death or reduction in fibrinogin.

The use of heparin in the treatment of thrombosis is discussed, and the dangers involved are outlined. The author advises the same dose for prophylaxis as for treatment of thrombosis. He believes that heparin is of aid in the dissolution of a clot as well as in its prevention, or in the prevention of its extension. In the use of heparin, slow absorption is considered much simpler and probably as effective, although somewhat more dangerous.

The author quotes a few conflicting views regarding the use of dicumarol, but obviously he prefers heparin because of (1) its immediate action, (2) the possibility of its more rapid neutralization, (3) the ease with which the effect can be controlled (protamine), and (4) the minimal toxicity. The use of vitamin K transfusions and thromboplastin for combating hemorrhage in patients receiving dicumarol is discussed. THOMAS C. DOUGLASS, M. D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Results of the Prothrombin Determination and the Deterioration Time of Thrombin in Various Surgical Conditions and Their Variations Following Surgery (Résultats de la détermination de la prothrombine et des temps de dégradation de la thrombine dans diverses affections chirurgicales et leurs variations sous l'influence de l'acte opératoire). R. FONTAINE, P. MANDEL, A. AMOIT, and R. RIVEAUX. *Lyon chir.*, 1951, 46: 169.

The authors have recorded the results of 984 prothrombin determinations, 253 of which were done in the preoperative period. Elevated levels were found in the presence of malignant tumors and peripheral vascular diseases, particularly venous thrombosis. The deterioration time of thrombin according to Lenggenhager was also found to decrease in the same two disease groups, although this value did not always parallel the prothrombin time.

The authors found that any type of surgery tended to produce a hyperprothrombinemia in the early postoperative period. They stress the fact that these two determinations are only a part of the clotting mechanism. THOMAS C. DOUGLASS, M.D.

Postoperative Diencephalic Syndromes in General Surgery (Syndromes diencéphaliques post-opératoires en chirurgie générale). P. MALLET-GUY, P. BLONDET, and J.-Y. BERBEN. *Lyon chir.*, 1951, 56: 185.

The authors report the occurrence of a diencephalic syndrome in 4 patients following major abdominal surgical operations after a normal postoperative interval of 8 hours to 2 days.

Extreme agitation of the patient without loss of consciousness or convulsive phenomena first calls attention to the syndrome. The neurological findings are those of hyperreflexia. The temperature rises rapidly without being preceded by a chill and remains high until terminated by death or recovery. Tachycardia (130–150), normal blood pressure, and a rapid respiratory rate were noted. The urinary output which is normal at first is followed by dehydration. The blood urea and glucose are normal.

The condition may progress to a fatal termination in 72 hours (1 case), or may be followed by an apparent crisis after 12 to 24 hours only to recur in from 4 to 14 hours with coma and death in from 8 to 10 hours. In 1 case recovery followed in 48 hours with only a residual low grade fever (39°C).

The similarity of the reactions of these patients to the experimental lesions of the diencephalon described by the neurosurgeons seems to justify the diagnosis in spite of the absence of autopsy confirmation.

Symptomatic treatment did not seem to change the course of the syndrome described. The authors believe that further studies on the pathogenesis of the condition are in order.

THOMAS C. DOUGLASS, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Local Application of Rutin for the Prevention of Disturbances of Wound Healing Caused by Penicillin (Die lokale Rutin (Rutinion) applikation zur Verhuetung penicillinbedingter Stoerungen des Wundheilverlaufes). W. STAEHLER, P. MATIS, and K. BAUER. *Med. Welt.*, 1951, 20: 118.

Locally applied penicillin may inhibit granulations by damaging capillaries in the wound area, increasing their permeability, and thus raising the amount of exudate. Penicillin does not exhibit any cytotoxic effect. Damage to capillaries is partly of an allergic, but mostly of toxic, character.

Inasmuch as it is known that rutin normalizes increased permeability and fragility of the capillaries, it occurred to the authors that it could be employed to counteract the undesirable effect of penicillin. It is necessary to use a type of rutin that is soluble, not in an alkaline medium but in a neutral medium.

The authors' findings indicate that topical application of rutin is at least as efficient as a similar treatment with vitamin C. The bacteriostatic effect of rutin exceeds that of vitamin C. The antibiotic activity of penicillin is not impaired by rutin. The solubility of trimethylolrutin is independent of the *p*H of the solvent, a fact which is of great importance in the healing process.

Combined penicillin-rutin topical applications are being employed by the authors in urologic surgery after nephrectomies, prostatectomies, and operations on the bladder, and in the treatment of fistulas, abscess cavities, and suppurating wounds. No untoward effect of rutin and no interference of penicillin with the healing process have been observed. The bacteriostatic effect of rutin on Escherichia coli is appreciated particularly in the treatment of wounds with mixed infections.

JOSEPH K. NARAT, M. D.

The Present State of Therapy of Burns (Ueber den heutigen Stand der Therapie von Verbrennungen). H. O. JOHNE. *Muench. med. Wschr.*, 1951, 93: 219.

This article presents a brief review of the management of burns.

Metabolic studies after severe burns have shown that the plasma protein and chlorides drop rapidly whereas the blood sugar rises. This hyperglycemia is probably due to increased glycogenolysis and glycogenesis from protein. Also the vitamin metabolism, especially that of ascorbic acid, thiamine, and riboflavin, is severely disturbed.

Shock should be treated by plasma transfusion. The addition of 5 per cent sodium bicarbonate to the plasma to counteract acidosis has been recommended. Other authors add 5 to 10 per cent protein hydrolysate to the plasma. As a substitute for plasma, dextran, a polysaccharide of the molecular weight of plasma protein, has been successful. Antihistamine drugs (neo-antergan, from 0.6 to 0.8 gm. daily) have been used because the presence of amino acids, creatin, creatinin, and urea in the edema fluid is considered proof of histamine action. Blood transfusions are less effective than plasma. Saline solution is ineffective and may be harmful as it readily permeates the capillary walls and increases the edema.

Toxemia is treated by adrenocortical hormone, glucose, and calcium given intravenously. High doses of vitamins are recommended; ascorbic acid (1 to 2 gm.), thiamine chloride and riboflavin (10 to 20 mgm.), and nicotinic acid (150 to 200 mgm.) should be given daily.

An isotonic and the isotonic "milieu bath," which are used after débridement has been performed, have proved successful. The formula is sodium chloride 870 gm., potassium chromate 22 gm., magnesium chloride 20 gm., sodium bicarbonate 120 gm., and monobasic sodium phosphate 30 gm. with 100 liters of water for the bath. The temperature is 37.5 degrees centigrade. It is emphasized that a permanent bath with plain water may have deleterious effects. As the osmotic pressure of the interstitial fluid is about six times higher than that of plain water, the water containing toxic substances is resorbed through the burned surfaces and increases the local edema and the toxemia.

To support the fight against toxemia with local treatment, a mucilage has been devised which contains 1 per cent trypsin activated with enterokinase and bile to digest necrotic tissue. It is applied to the burned surface.

Of the numerous methods of local treatment only a few can be mentioned here. Tannic acid treatment should be abandoned altogether as necrosis of the liver has frequently been observed in autopsies of patients treated by this method. American authors have had success with phlobatannin, a substance made from the bark of Pinus Caribaea which also contains tannin but is less toxic than tannic acid.

Sulfonamides and penicillin do not have a beneficial effect on healing but may be protective against secondary infection. Especially the "live dressing," living penicillin notatum fungus on a sheet of agar, has been successful when applied to the wound. The fungus grows on the surface of the agar, and the penicillin reaches the wound by diffusion through the agar. From 2 to 5 units of penicillin per square centimeter are produced by this method. Some authors reject the local application of sulfonamides and penicillin because of the danger of sensitization.

Other substances recommended for local treatment include cod liver oil ointment, with or without sulfonamides, chlorophyll, furazin (5-nitro-2-furaldehyde semicarbazon), and various dyes. One author recommends a mixture of dried plasma 10.0, sulfonamides 1.0, aq. dest. ad 100.0, which, applied to the burns, forms a protective elastic film.

Some writers believe that air-borne infection plays the most important role in burns. To protect the wounds from contamination by air, dressings with airtight cellpohane insets are used and changed under strictly aseptic conditions in a special room of which the air is filtered against bacteria. With this method less than 1 per cent of wound infections were observed in a series of 743 burns.

Finally, problems arising from a possible atomic blast are briefly discussed in the article. Since lesions caused by beta rays become visible only after an interval of from 5 to 7 days, first aid in atomic explosions does not differ from that administered in other burns.

WERNER M. SOLMITZ, M.D.

Treatment of Hydrofluoric Acid Burns. R. H. DALE. *Brit. M. J.*, 1951, 2: 728.

Hydrofluoric acid is used in a number of industries, mainly those associated with silica and glass processing. Though the acid dissociates to a small degree to form a weak acid, it has the power to cause considerable tissue damage. A strong acid solution causes immediate pain, whereas a weaker solution may take an hour to produce pain. The peculiar characteristics of a hydrofluoric acid burn are the extreme amount of pain associated with it, and the large amount of deep tissue coagulation that may accompany a superficial skin lesion. Extensive latent tissue destruction is characteristic.

Treatment must be immediate. It consists of thorough washing in soda bicarbonate solution. This is followed by massage of magnesium oxide in glycerine into the burned skin, in the hope that the hydrofluoric acid may be converted to insoluble magnesium fluoride. As soon as possible, and with the aid of local or general anesthesia, a 10 per cent solution of calcium gluconate is injected into and under the coagulum of the burn. This was found to limit tissue damage somewhat by theoretically producing the insoluble calcium fluoride.

Once the burned area has been determined, excision and grafting are done in the usual manner of treating thermal burns. A case report is included.

ROBERT L. CRAIG, M.D.

Treatment of High Intensity Burns. EVERETT IDRIS EVANS. *Arch. Surg.*, 1951, 62: 335.

About 50 per cent of the casualties at Hiroshima and Nagasaki were due to flash burns, and in the event of atomic explosions in our own cities the treatment of these burns will present a medical problem of great magnitude. The methods of therapy to be used must be as simple as possible, and a minimum number of trained and untrained personnel is required in order to treat these great numbers of burn casualties with maximum success.

Present knowledge seems to indicate that there is no significant difference in the characteristics of "flash burns" from atomic explosions and the slower type of burns usually encountered in civilian practice. Therefore, careful observation of the course and principles of treatment in 124 severely burned patients and in 574 less severely burned patients was carried out with the aim of determining the best methods for care of the burn patient in case of atomic disaster.

The three main aspects of emergency burn treatment are summarized in the following order:

Prevention and treatment of burn shock. Blood and plasma are the ideal fluids to correct the loss of blood volume in burn shock. If supplies are low, gelatin and dextran may prove to be satisfactory plasma substitutes. The amount of blood or plasma to be given can be determined by such formulas as that requiring 100 c.c. of plasma for each point rise of hematocrit over 45 per cent; however, since the supply of laboratory personnel may be inadequate in atomic disaster, a simpler rule is presented. During the first 24 hours, 1 c.c. of plasma per kilogram of body weight is given for each per cent of body burned. Half of this amount is given in the next 24 hours. If over 25 per cent of the body surface is burned, blood and plasma are given in equal amounts, regardless of hematocrit levels. Burn shock has been successfully prevented by this method in this series.

The emergency dressing. Outside the 1,500 to 2,000 yard zone from the center of an atomic explosion, most of the flash burns are of the portions of the body not protected by clothing, i.e., the face and hands. Most face burns heal best with a simple covering of any oil and no further dressing, although exceptionally deep burns may cause deformity and require early correction with plastic surgery. Use of a large one-piece burn dressing for burns of the body and extremities has proved effective and can be applied by lay persons in only a fraction of the time required for trained personnel to apply the customary occlusive pressure dressing which has been generally adopted. Efforts are being made to devise a similar type of one-piece dressing for burns of the hand. The feasibility of the "exposure treatment" in large numbers of burn patients is questionable, as is the local use of antibiotics in the dressing against the burned area.

Fluid and electrolyte requirements. On admission, a polyethylene tube is inserted in an external saphenous vein and a continuous drip is maintained for the first few days, altering the speed and type of infusion to suit the calculated needs. The volume of normal saline to be given is calculated in exactly the same manner as for blood and plasma. In addition, the urine output from an indwelling catheter is carefully recorded and an output of at least 50 c.c. per hour is maintained by giving 2,000 c.c. of 5 per cent dextrose in water each 24 hours. If the output falls below 25 c.c. per hour, more blood or plasma is given. Too much fluid may cause pulmonary edema and too little may cause renal damage. In patients with direct pulmonary burns, the urinary output is best kept at about 25 c.c. per hour.

Problems of the subsequent care of mass burns are discussed under four headings:

Prevention and treatment of burn anemia. Adequate blood infusion during the shock phase will prevent anemia. Hematocrit evidence of hemoconcentration is not a contraindication to whole blood transfusion. If necessary, enough whole blood is given weekly to keep the hemoglobin above the 14 gm. level, and also at each skin grafting operation.

Oral feeding of the burn patient. The oral route for administering the essential foods is the most effective one if intake is adequate. However, in severely burned patients such intake is almost always unsatisfactory and tube feedings are started on the fourth day, using a well balanced high protein, high caloric, low fat formula with supplementary vitamins. Exact contents of this formula are listed.

Early plastic surgery. The original dressing is left on for 10 to 14 days and a second similar dressing is left in place for about a week. Most patients who will require surgery need only a simple covering of raw surfaces with split thickness grafts. This is usually done about 4 weeks after the injury if all slough has been satisfactorily removed by that time.

Physical measures. Adequate care of the skin, early active exercise of all joints including those covered by dressings, the use of a footboard, and the generous use of physical therapy in the later stages are all stressed as important features in the subsequent care of the burned patient.

The well treated, severely burned patient should be recovered from his injury within 3 months, while poorly treated patients often take 1 or 2 years, or more, before they can return to their normal duties. The mass burn casualties which will confront the doctor in the event of atomic warfare will present a tremendous problem which can be solved only by careful planning in advance, and such studies as the one here presented. STANLEY W. TUELL, M.D.

Macrodex in the Treatment of Extensive Burns. H. ROSENQVIST and H. G. R. THORSÉN. *Arch. Surg.*, 1951, 62: 524.

Macrodex consists of 6 per cent dextran in 0.9 per cent solution of sodium chloride. Dextran is a high molecular polysaccharide of glucose. The viscosity, specific weight, and colloid osmotic pressure of the solution are approximately the same as those of plasma. It is practically free from nitrogen, and is nontoxic. Approximately 75,000 injections have been given in different conditions with favorable results, in Sweden. The frequency of unfavorable reactions calculated from 25,000 transfusion units given in Sweden is 0.2 per cent. It is pointed out that most of the dextran molecules remain in the blood stream for some time and maintain intravascular colloid osmotic pressure. The great attraction for water helps to maintain a large volume of plasma in circulation, causes the absorption of edema

fluid from the tissues, and eliminates any tendency to hemoconcentration.

Since several reports of its efficacy in the management of shock due to various conditions were very promising, macrodex was administered to 11 patients with thermal burns involving more than 20 per cent of the body surface. The amount of fluid injected varied according to the size of the area involved. When the burn surface covered 20 to 30 per cent of the body, about 4 to 6 liters of macrodex were given during the first 48 hours. When the lesion covered more than 30 per cent of the body, 8 to 10 liters were given during the first 48 to 60 hours. In spite of such large amounts of fluids, signs of overhydration such as pulmonary edema were never seen. The usual practice was to give 1,000 c.c. of macrodex, alternating with 450 c.c. of citrated blood. The administration of macrodex caused a large drop in the plasma protein. Protein concentrations as low as 2.5 gm. per 100 c.c. were observed.

The authors believe that in these 11 patients the use of macrodex proved to be as good as plasma in preventing and reducing hemoconcentration and in maintaining the blood pressure. They believe it is superior to plasma in that it does not require the organization of plasma banks and does not incur the risk of virus infection. No storage problems are involved; the product is not expensive and can be stockpiled. It is emphasized that macrodex should be of particular value in small hospitals without large reserves of plasma and that it may prove invaluable in major catastrophies.

CURTIS ARTZ, M.D.

Local and General Treatment of Acute Extensive Burns; the Open-Air Régime. T. G. BLOCKER, JR. *Lancet*, Lond., 1951, 260: 498.

The open-air method of treatment of burns was investigated from the standpoint of feasibility for mass therapy during disaster periods. Shock is treated by infusions of whole blood and the correction of electrolytic, fluid, and protein imbalance. Oral saline-bicarbonate solution (NaCl, 3.5 g. and $NaHCO_3$, 1.5 g. per 1,000 ml. of distilled water) is substituted for intravenous solutions except blood. Occasionally, Ringer's lactate solution is administered intravenously because of vomiting or intolerance of the oral fluid. The saline-bicarbonate mixture is discontinued when diuresis begins. At that time forced feeding through a plastic stomach tube is started. The feeding formula contains 150 gm. of protein, 340 gm. of carbohydrate, and 60 gm. of fat in 1,000 ml. solution. This fluid is delivered at a constant rate of 2 ml. per minute into the stomach. An average of 1,500 ml. to 2,000 ml. of the mixture is given daily.

Seventy burned patients were treated by the open air method without any attempts to observe the usual sterile techniques. Débridement is not done, except that gross dirt is removed with liquid detergent solution. The burned area is exposed to the air at room temperature. When necessary, the extremities are raised with mechanical devices. The fingers of the hand are maintained in the position of function. When cracks develop in burn crusts they are covered with a single layer of gauze moistened in saline. Second degree burns usually heal in 8 to 16 days, and third degree burns are ready for grafting at the same time.

The open air method of burn therapy was found to be superior to other methods. Patients were found to require fewer blood transfusions after recovery from shock, were more comfortable, and seemed to suffer less pain. Pyrexia was of a lesser degree and the need for antibiotics was reduced. The necessity for extensive skin grafts was lessened. Patients were ready to leave the hospital within 8 to 10 weeks after burning.

BENJAMIN G. P. SHAFIROFF, M.D.

The Anemia of Thermal Injury. Studies of Pigment Excretion. G. WATSON JAMES, III, OLIVER J. PURNELL, and EVERETT I. EVANS. *J. Clin. Invest.*, 1951, 30: 181.

The authors' interest in the metabolism of hemoglobin in patients with thermal injury was stimulated by early observations that (a) in spite of multiple whole blood transfusions, anemia often developed rapidly in the first 96 hours after injury, and (b) in the protracted convalescence of a patient with only a small burn, moderate anemia inevitably ensued. The latter was exceptionally refractory to all except replacement therapy. With these two facts in mind, they have undertaken the present study of the burn patient in an attempt to answer the following questions: (1) to what extent does hemolysis occur, and (2) what information about the anemia of the protracted convalescent stage might a continuous investigation of heme metabolism give us?

This study would make it appear that in the severely burned patient hemolysis must always be considered in the evaluation of the anemia and in the treatment of the early postburn phase. Even in the less severely burned patient, hemolysis takes place. Brooks and his colleagues have demonstrated sludging of the red cells with subsequent agglutination and phagocytosis. Red cell destruction is associated with the opening of the porphyrin ring and subsequent degradation of hemoglobin to open chain tetrapyrroles. In these patients the drop in hemoglobin, the rise in hemolytic index, and often a rise in the indirect type of serum bilirubin are other experimental data to support this concept. In one severely burned patient there was evidence of hemolysis from admission to demise 32 days later.

In the study of the burn patient, during convalescence and grafting, the ratio of the fecal urobilinogen to the total circulating hemoglobin would seem to point to decreased hemolytic activity, which may result from decreased hemoglobin synthesis. Actually the hemolytic index is lowered. Increased coproporphyrin excretion may also be a reflection of some disturbance in hemoglobin synthesis.

The synthesis component of the anemia of burns has been very thoroughly discussed by Moore and his associates and they have used the method of estimating the uptake of radioactive iron as a guide in evaluating the marrow depression. One study showing a low fecal urobilinogen excretion, and hence hemoglobin catabolism, with low hemolytic indices in the convalescent phase, suggests a decreased breakdown. The authors believe that one of the most important factors in the apparent marrow depression is the presence of bacterial growth on the burned area. The urinary coproporphyrin studies during the convalescent phase may favor this idea; however, the urinary coproporphyrin findings may be evidence of liver malfunction.

Moore and his colleagues described increases in urine urobilinogen in their patients. These data are in agreement with their work. The authors interpret differently the increased quantity of urine urobilinogen even though there is an increased amount of fecal urobilinogen in the stool. The level of the urinary urobilinogen is probably a very sensitive index of liver cell function. In burns, what is measured by the urobilinogen excretion is not only evidence of hemolysis, but also impairment of the ability of the liver to properly catabolize the increased amounts of this substance.

The present studies would seem to answer the question concerning the occurrence of hemolysis. Hemolysis occurs extensively, particularly in the large burn, and must always be reckoned with in evaluating these patients. This study has not answered the second question entirely to our satisfaction. A continuous investigation of heme catabolism shows that there is a decreased breakdown of heme products during the convalescent phase of burns. It gives very little insight into the mechanisms involved in this process. In severely burned patients, during the long convalescent phase there may be considerable hemolysis taking place as evidenced by an increased hemolytic index and an increased fecal urobilinogen. Increased breakdown coupled with a depressed bone marrow would make the anemia more severe. As indicated in one patient, in spite of a repeated transfusion, anemia progressed rapidly.

No conclusion can be drawn about the effect of aureomycin as far as anemia of thermal burns is concerned, but one might draw some interesting speculation about urobilinogen metabolism and Ehrlich-reacting substances in the feces in patients who are receiving oral aureomycin. It would appear that aureomycin can effectively sterilize the gastrointestinal tract, so that at least the main reduction agents of bilirubin are inhibited to such an extent that little or no reduction of bilirubin occurs. The authors, nevertheless, consistently found in the feces a small amount of Ehrlich-reacting substances. Whether these small quantities are separate and entirely different compounds from urobilinogen, one is unable to say. They are tempted to think there may be other substances since, in patients in whom are expected large increases of urobilinogen, the detectable quantity of these compounds remains almost the same as that in patients who are excreting only an expected small amount of urobilinogen.

BENJAMIN GOLDMAN, M.D.

The Anemia of Thermal Injury. Studies of Liver Function. G. WATSON JAMES, III, OLIVER J. PURNELL, and EVERETT I. EVANS. *J. Clin. Invest.*, 1951, 30: 191.

Minor to extensive third degree burns show early impairment of the liver function as judged by changes in the liver function tests employed in this study. The more severe the burn, the greater the amount of change in liver function.

One of the most constant changes was the increase in urine urobilinogen excretion and alterations in the albumin-globulin ratio, both considered to be sensitive evidences of liver function.

Autopsy material on 5 cases of burns which proved fatal showed no constant histopathologic change, but there was evidence of fatty infiltration, cloudy swelling, increased pigments in the reticuloendothelial cells, focal necrosis, and congestion in the liver substance.

More study is necessary to understand the mechanism whereby liver function failure occurs, and attention should be directed at the prevention, as well as the treatment, of liver dysfunction in severe burns.

BENJAMIN GOLDMAN, M.D.

Grave Radiodermatitis with Skin Corrugation (Radiodermitis grave y colgajos pediculados). HÉCTOR MARINO and JAIME FAIRMAN. *Prensa méd.*, argent., 1951, 38: 143.

The disfigurement after therapeutic x-ray irradiation is sometimes profound with cicatrization extending into the deeper structures. Treatment of these lesions frequently requires the transplantation of whole skin grafts. The author reviews the subject and presents approaches to various parts of the body from the neck to the sole of the foot, with illustrations of the results. With the use of antibiotics, hazards from infection and sloughing of the grafts are infrequent. Takes are better, and drainage is lessened.

Preoperative as well as postoperative antibiotic therapy, consequently, is recommended.

STEPHEN A. ZIEMAN, M.D.

Infection of "Clean" Surgical Wounds by the Surgeon and from the Air. G. R. GIRDLESTONE, R. B. BOURDILLON, and ALLAN M. MCFARLAN. *Lancet*, Lond., 1951, 260: 597.

This paper is divided into 3 sections: the first section (by Girdlestone) deals with the surgeon's activities as they concern wound infections; the second, with airborne infection (by Bourdillon), and an appendix (by McFarlan) gives the report on the investigation of a wound infection.

The advances in anesthesia, surgical technique, hemostasis, and the wiser use of transfusion have

added to the scope and length of operation. This should increase the precaution against infection, since the risk of infection increases with the length and severity of the operation.

Care of the tissue is of primary importance. Unnecessary trauma to tissue can be avoided by sharp dissection, swabbing with momentary pressure and without a rub, exposure by design of incision rather than powerful retraction, and accurate hemostasis. It is recommended that operation be performed without a tourniquet when this can be done with equal accuracy. A tourniquet, when used, should be removed for hemostasis before the wound is closed. All stitches should be tied gently. Exact approximation of the skin edges is accomplished more by how the stitches are inserted than by pulling them tight. Care should be exercised in the application of postoperative plaster casts to insure free circulation to the part immobilized.

About a third of the population of England carry Staphylococcus aureus in the nose or skin, and the proportion is probably higher in a hospital staff. No method of preparation provides sterility right through the skin, but 2 per cent iodine in 70 per cent alcohol applied to the dry skin seems most effective in producing a surface which is sterile. This surface will remain sterile for an hour or more unless the sweat glands become active. The author recommends thorough washing of the skin on the day prior to operation and then leaving the skin uncovered until operation. Once the skin is incised, sweat glands and hair follicles are laid open, with exposure of resident bacteria. The edges of the cut thus become a possible source of infection.

The author does not use skin towels, but instead, wipes the surface and skin edges after incision and every 30 minutes thereafter with a mild antiseptic. The clamps used to hold towels in place lead to local trauma and ischemia of the skin, and tend to squeeze out material from the glands. Evidence supports, but does not prove, that some patients become infected from staphylococci of their own skin. The multiplicity of sources of Staphylococcus aureus infections is indicated from investigation reports.

Deep infection is closely related to the length of the incision and the duration of exposure of the deeper tissues.

It is possible for the area of operation to become infected from a peripheral skin lesion via lymphatics passing through it.

Drying, powdering, and gloving of the surgeon's hands need considerable care to avoid any risk of contamination. Because of the frequent puncture or tear of the surgeon's gloves (about a 24 per cent incidence), this provides a frequent danger of infection. Staphylococcus aureus can be frequently cultured from the inner surfaces of the gloves. As little contact as possible with the wound (from gloves, or from instruments touching gloves) is desirable.

Methods for sterilization of instruments, equipment, and materials are described. The care of the operating theater to prevent direct contamination of wounds is also described.

In many theaters the dangers of contact infection are probably greater than those of airborne infections; however, airborne infection is a real danger and simple measures such as improved ventilation will often do much to reduce air contamination. The chief sources of air contamination are the air supply to the operating room, infection of the air in the operating room by the surgeon and his staff, and by the patient and his coverings. At the Wingfield-Morris Orthopedic Hospital of Oxford, the chief cause of contamination of the operating theater was the sucking under doors of air from the adjacent room, floors contaminated by dust from the ward blankets, the porters' feet, and rooms in which infected wounds were handled. An exhaust fan in the operating room was responsible for the drawing in of the contaminated air. The introduction of a positive pressure ventilation system, so that filtered air flowed outwards from the operating room under the doors to hall and adjacent rooms, resulted in marked lowering of the bacterial count in the theater. It is to be remembered that the temperature differences between operating room and adjacent rooms will cause movement of air. The thermal air currents, however, are less dangerous than the sucking currents, moving relatively slowly and not picking up bacterial particles from the floor.

Infection from respiratory tracts of the staff is always a potential danger even when care is taken with masks. Rigorous exclusion from operating theaters of all persons carrying an active infection is advisable. Infection from particles scattered from the hair of staff, including eyelashes and eyebrows, should be guarded against. The hair of everyone in the theater should be fully covered. The author recommends the use of oil or cosmetic cream to the hair, face, and eyebrows of those who are liable to place their heads above the wound, to prevent showers of bacteria into the wound. Clothing of the assistant staff may be a source of contamination if not properly worn or fully covered.

The patient's nasopharynx may be an appreciable source of infective particles. It is desirable that the direction of the airflow be from the wound to the anesthetist because of possible contamination from the patient's respiratory system. Such things as turning patients, bringing blankets into the operating room, and using unsterilized materials as covering for the patient increases the risk of wound contamination. Oiling of textiles to reduce the number of particles shed is recommended.

The author suggests that standards of purity of air for the operating theater be set and maintained in order to reduce the incidence of infection of surgical wounds.

The investigation of a wound infection following a clean operation is reported. The organisms involved, sources where found, and corrective procedures for the prevention of such wound infection are given. JACOB T. BRADSHER, JR., M.D.

Newer Antibiotics in the Treatment of Anthrax. HERMAN GOLD and WILLIAM P. BOGER. *N. England J. M.*, 1951, 244: 391.

The authors present a total of 8 cases of anthrax infection. All of the patients were employed in one industrial plant where they handled goat hair which was imported from India and Africa. In every case the diagnosis was confirmed by smear and culture of the lesion, which was usually manifested by an ulcerative anthrax pustule. Aureomycin, chloromycetin, or terramycin were administered orally and found to be effective therapeutically against anthrax infection. An arbitrary schedule of dosage of the antibiotics, varying from 1 gm. to 500 mgm., was followed, with the time adjusted to the surgeon's judgment. Erythema and the local edema of the infection subsided within 48 hours after the beginning of use of the antibiotics. Aureomycin was less desirable than the other antibiotics because it caused nausea and vomiting. Regional adenopathy persisted for a few days after subsidence of the infection. None of the patients was hospitalized.

BENJAMIN G. P. SHAFIROFF, M.D.

ANESTHESIA

Newer Anesthetic Agents in Children, with Special Reference to Trichlorethylene and Kemithal. C. R. STEPHEN and H. M. SLATER. *Anesthesiology*, 1951, 12: 135.

Trichlorethylene is ethylene with three chlorine atoms substituted for three atoms of hydrogen in the chain. It is a colorless, noninflammable liquid boiling at 87 degrees C. After 4 or 5 days' exposure to light or air, toxic decomposition products form. Most of the anesthetic is eliminated from the lungs, although a small amount can be found in the urine, in the form of trichloracetic acid. Although not widely used in the United States, it has been used by one British author 40,000 times without serious difficulty. It can be used with nitrous oxide and oxygen to cause a smooth induction. Its main advantages are a degree of analgesia not matched by other agents, rapid recovery (outpatients may walk out 20 minutes after anesthesia), nausea and vomiting are rare, and at least 25 per cent oxygen can always be used during anesthesia. It is well tolerated in children over 2 years of age. Disadvantages are due to the fact that muscular relaxation is difficult with this agent alone, tachopnea may occur, and bradycardia with some cardiac arrhythmias may result from its vagotonic activity.

Kemithal is a short acting barbiturate used intravenously. Its indications are the same as those of pentothal. Because it depresses respiration less and has a higher margin of safety than other short acting barbiturates, it has been used on children. Being primarily a hypnotic, it is combined with other anesthetic agents (usually nitrous oxide and oxygen, or curare are used) to provide muscular relaxation. A large dose of 5 per cent kemithal is used initially and is not repeated for about an hour. In this way it has been used over 1,000 times without difficulty. Induction laryngospasm as well as postoperative nausea and vomiting are rare. This drug may not replace pentothal, but because of its greater margin of safety it has found considerable usefulness in children.

ROBERT L. CRAIG, M.D.

Anesthesia for Cardiac Surgery in Children. D. F. VAN NOUHUYS. *Acta. chir. belg.*, 1950, 49: 914.

Anesthesia employed in 30 operations on 26 children is described by the author. Among the 30 surgical procedures, there were 21 Blalock type operations on patients with tetralogy of Fallot, and 3 Exalto type operations for congenital strictures of the trachea and the esophagus by a double aortic arch.

The following method was used in blue babies: induction with ether and oxygen, spraying of the nose, the pharynx, and the glottis with 10 per cent cocaine, and thereafter reinduction. After a short period during which pure oxygen was administered, one attempt at blind intubation was made. If this attempt failed, intubation under vision was performed, by the nasotracheal route. Anesthesia was continued by closed circuit cyclopropane-oxygen. After the first few cases, ether was omitted and cyclopropane was used exclusively for the entire procedure. No attempt was made to keep the operative field motionless at the expense of the child's condition, especially after clamping the pulmonary artery.

In very cyanotic children, occlusion of the pulmonary artery is followed by augmentation of hypoxemia. The resulting gasping respirations may be suppressed by deepening of anesthesia, increased dosage of curare or, preferably, by a change from controlled to assisted respiration.

The author employs the nasal route because he is more familiar with it than with the oral route and because it facilitates the choice of the tube; one that passes the nose usually fits airtight in the glottis. Nor is the nasal tube easily dislodged by a change of position of the head, caused, for instance, by a rib resection.

As a rule, 0.5 mgm. of curare per kilogram of body weight was given. The last dose was never administered in less than an hour before the end of the operation. Prostigmin was never required.

There were no deaths on the operating table and there were no cases of postoperative atelectasis or pneumonia.

In the children with double aortic arch, the greatest difficulties were encountered during the induction period. Aspiration of excessive secretion after intubation was very helpful. Ventilation of the lungs could be accomplished only by pressure on the rebreathing bag. After premedication with morphine and scopolamine, ether and cyclopropane-oxygen were administered by closed circuit. Scopolamine is preferred to atropine because the latter raises the metabolic rate and increases oxygen consumption.

JOSEPH K. NARAT, M. D.

The Use of Pontocaine for Regional Anesthesia: An Analysis of 3,000 Cases. JOHN J. BONICA. *Current Res. Anesth.*, 1951, 30: 1, 76.

The author presents an excellent review of the clinical and experimental literature on the use of pontocaine for regional anesthesia, and those interested should read the original paper for further details. The author believes that when regional anesthesia is properly administered and completely effective for the duration of the anesthesia, certain advantages are to be had which are not obtainable with general anesthesia.

The early use of procaine for regional anesthesia was found to be entirely satisfactory, except that the duration of the anesthesia was approximately 1 to 1½ hours in maximum dosage. This led to a search for a local agent which would afford sufficient duration to complete operations without undue haste. Pontocaine was considered because of its prolonged effect on spinal anesthesia.

Pontocaine is officially known as tetracaine. Aqueous solutions have a powerful hypotonic effect and, therefore, the drug must not be prepared in water but rather in saline solutions which are free from isotonic disturbances and hemolysis. The drug is stable in air and may be boiled and sterilized repeatedly without deterioration. Pontocaine and nupercaine in 0.1 per cent solution, and novocain and tutocain in 1.0 per cent solution were compared experimentally. It was found that the onset of anesthesia was a little slower with pontocaine than with novocain, and that the duration was longer with nupercaine and pontocaine, and shortest with novocain.

The injection of either pontocaine or procaine caused no pain. Pontocaine was more than 10 times as potent as procaine, and when used in one-tenth the dosage of the standard drug it yielded several times the duration of anesthesia. The toxicity of pontocaine was approximately 5 mgm. per kilogram of body weight. If 50 mgm. per kilogram is accepted as the toxic dose of procaine, then pontocaine is about 10 times as toxic as the standard. Only large doses of pontocaine caused hypotension and respiratory disturbances in dogs, similar to those produced by procaine. Pontocaine in approximately one-tenth the dosage of procaine usually employed for anesthesia lasted two to three times as long. Negative inotropic action and decreased rate of the isolated heart was noted with pontocaine, and also with cocaine, novocain, and pentobarbital. Pontocaine, like procaine, can inhibit auricular fibrillation in the dog. Hemolysis does not result from the use of this anesthetic. This drug, like other anesthetic agents, except cocaine, has a vasodilating action, and if this is sufficient, a drop in blood pressure occurs. In this regard, pontocaine has less effect than procaine. The drug also causes hypertonia and augments the amplitude of contractions of the isolated septum. Dilute solutions of pontocaine afford long-lasting results varying from 3 to 6 hours without any increase in toxicity.

The author has employed pontocaine in regional anesthesia (other than spinal and topical) in 3,089 procedures. In carefully controlled results, anesthesia with 0.15 per cent pontocaine for brachial plexus block lasted four times as long as that produced by 2 per cent procaine, and over three times as long as that with 1.5 per cent metycaine, and there was a decrease rather than an increase in the incidence of toxic reaction.

Approximately 49.6 per cent of the blocks were administered for surgical anesthesia and the other 50.4 per cent were administered for diagnosis, prognosis, and therapy of nonsurgical conditions. Pontocaine regional anesthesia was found adequate for any type of surgical procedure varying from resection of the lip or facial tumor to radical mastectomies and renal operations (for which thoracolumbar paravertebral blocks were performed). The length of the anesthesia for operations varied from an average of 31 minutes for a biopsy of the breast, to 3 hours and 30 minutes for an intrathoracic operation. The dosage of pontocaine used varied from 6 mgm. for a block of the trigeminal nerve to 158 mgm. for a radical mastectomy under brachial, cervical, and intercostal block. The average doses were approximately 50 mgm. A total of 1,575 diagnostic, prognostic, and therapeutic blocks were required for various conditions including neuralgia, causalgia, postoperative pain, pain in malignant disease, vascular disorders, and musculoskeletal problems.

Total milligram dosage depends not only on volume but also upon concentration. The latter has varied according to the patient, the type of block, and the prevailing circumstances. In children and poor risk patients, dilute solutions, usually from 0.025 to 0.075 per cent, have been used, whereas in adults in good physical condition, from 0.15 per cent to 0.2 per cent solutions have been employed. Generally, the dosage has been kept to about one-tenth the dose of procaine. Concentration has often been varied according to the type of block, and if the larger nerve trunk was to be anesthetized, small volumes of from 0.15 to 0.25 per cent solutions have been used, whereas if smaller nerves were to be blocked in regions where infiltration was to be employed, dilute solutions were administered.

Other considerations in determining concentrations were: the required speed of onset (the greater the concentration the quicker the onset); the duration of the desired analgesia (the greater the concentration and total dosage the longer the duration); the organ to be anesthetized (in the neck, less total dose of the dilute dilution should be used to avoid reaction); the intensity of effect desired (for motor block higher concentrations are needed than for sensory or sympathetic block). One-tenth to 0.15 per cent is adequate for any type of block. In no case should the total dose exceed 1 mgm. per pound of body weight.

Detailed observations during this study of the anesthetic properties and toxicity of pontocaine have been charted. The time of onset for pontocaine

analgesia is from 25 to 30 per cent longer than for procaine, and with the usual block it amounts to from 5 to 8 minutes. The onset of anesthesia with 0.1 to 0.15 per cent solutions occurs within 20 minutes and depends upon the proximity of the needle to the nerve, the size of the nerve trunk, and the concentration of the drug. If a more prompt onset is desired a small amount of 2 per cent procaine may be added to the mixture, or the block may be done with stronger solutions. The 0.15 per cent pontocaine solution increased the duration from three to four times that of 2 per cent procaine. In certain types of block the duration of analgesia was not as long as in others, particularly in blocks of the cranial nerves and the cervical plexus. In these cases the solutions were injected into vascular areas and, consequently, the absorption of the anesthetic agent was greater per unit of time. One tenth per cent pontocaine with epinephrine affords a duration of anesthesia approximately three times that of 1 per cent procaine with epinephrine. In all cases the block disappeared without leaving any trace of its action and no neurologic complications or sequelae occurred.

In small doses these drugs are stimulants. Minimal reactions are manifested by slight stimulation of the central nervous, cardiovascular, and respiratory systems, with subjective symptoms of dizziness, tinnitus, vertigo, and signs of slight hypertension, tachycardia, tachypnea, and hyperpnea. Enlarged doses of these drugs are depressant and there may be unconsciousness, a severe drop in blood pressure, bradycardia, and respiratory paralysis. Barbiturates protect the patient against minimal and moderate reactions but do not prevent severe reactions; they merely decrease the degree.

No report has been found in the literature regarding severe toxic reactions or fatalities from pontocaine during infiltration in block analgesia. The most important causes for reactions which have occurred in topical analgesia are overdosage, the use of solutions without epinephrine, and the use of solutions of high concentration; pontocaine in 2 per cent concentration without epinephrine is a powerful vasodilator, and, when applied to a vascular area like the mucous membrane, is rapidly absorbed. If large amounts are employed, a toxic reaction may occur. Pontocaine in 0.1 to 0.2 per cent solution does not cause a reaction, and in 3,089 cases of this series only 1 moderate reaction was observed. Most patients who have received blocks for surgical procedures were given barbiturate as preanesthetic medication and, when necessary, pentothal was administered during the block to alleviate discomfort and apprehension.

In summary, this drug has an anesthetic potency greater than 1, and the toxic ratio is less than 1 when compared with the standard drugs—procaine and cocaine. HERBERT J. KAROL, M.D.

Preoperative and Postoperative Care in Anorectal Surgery. LESTER J. JOHNSON and FREDERICK W. SCHILLA. *Am. J. Surg.*, 1951, 81: 33.

This article is an analysis of the replies given by more than 300 members of the American Proctologic Society to a questionnaire concerning their preoperative and postoperative treatment in rectal surgery.

In the preoperative period there was little variation in practice in bowel and skin preparation, and 70 per cent of the workers carried out a routine serological test for syphilis. Only 20 per cent were in favor of the preoperative use of chemotherapeutic agents or antibiotics. Spinal anesthesia was the most popular choice. General and caudal anesthesia were used less frequently, and local anesthesia by infiltration was used by only 1 in 4. More than 30 per cent employed hemostatic absorbable dressings, and the old-fashioned wide and firm "flatus tube" has fallen into almost complete disrepute.

Postoperative discomfort was commonly relieved by the use of the sitz bath from the second postoperative day, or its alternative use with hot compresses. Few workers seemed to have had much experience with the antispasmodic drugs for the relief of postoperative retention of urine; 1 in 5 routinely passed a catheter in the immediate postoperative period. Digital examination to relieve spasm of the sphincter, and to encourage drainage and even wound healing was favored by almost 75 per cent.

M. R. EWING, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Roentgenological Study of Cerebral Angiomas (Studio radiologico degli angiomi cerebrali.) GUIDO LOMBARDI. *Radiol. med.*, Milano, 1951, 37: 16.

Cerebral angiomas, on account of their peculiar nature, are studied from the neurological and neurosurgical standpoints, but less often from the roentgenological standpoint.

Accurate interpretations of x-ray films of these tumors are of aid in obtaining a more comprehensive understanding of this affection.

Cerebral angiomas are comparatively rare, as they comprise only 1.8 per cent of all brain tumors.

Angiomas are formed by knots of anatomically differentiated or partially differentiated vessels within the nervous tissue. The brain tissue found within and around the lesion presents an atrophic change that often extends over the whole hemisphere.

The blood that circulates in the tumor is carried by large veins without passing through a capillary network.

Angiomas may develop in any part of the hemisphere and show no special preference for any particular site. They often reach a conspicuous size.

The fundamental signs of these tumors are epileptic attacks, subarachnoid hemorrhage, and, less frequently, hemiplegia and hemiparesis.

Men are affected more often than women in a ratio of 2 to 1. Adults in the second and third decades of life are most often affected.

Recent progress in arteriography is due to the fact that only a small amount of a nonradioactive contrast medium, introduced through the skin, is required to carry out the examination.

Experience has shown that multiple x-ray films are required to follow the different phases of circulatory changes peculiar to cerebral lesions. Four or five pictures are taken at time intervals, regulated by a stop watch, beginning within 5 seconds after the injection of the medium. The interval between exposures is approximately 1 second.

The circulation of the angioma uses up one-half of the contrast medium in 2 seconds. In order to obtain a complete documentation, it is necessary to make the majority of the exposures in that time.

To obtain a good injection of the normal and pathological vascular system, it may be necessary to increase the amount of contrast medium from 10 to 15 c.c. and take the first x-ray film after 6 to 8 c.c. of the medium have been injected. In order that an exact amount of the medium is injected, a syringe with an automatic control must be used.

In cases in which the clinical symptoms are uncertain and positive signs are not obtained from examination of one side, arteriography must be carried out on the opposite side before a negative report can be given.

Both frontal and lateral views should be made in all instances of arteriography, all the recent techniques being used for obtaining a clear x-ray film. The best technique is required in all cases, because the interpretation of the angiograph is based on the visibility and the appearance of the most slender vessels.

Usually no special preparation is necessary prior to examination. An injection of morphine before examination may sometimes be necessary, but anesthesia is required in only the most extreme cases of nervousness.

Contraindications to the use of this method of examination exist in cases of extremely high blood pressure, and in those with recent episodes of hemorrhage. In cases in which hemorrhagic episodes complicate the picture, examination should be delayed for at least 2 weeks.

Arteriography is indicated in the cases in which there is a history of one or more episodes of subarachnoid hemorrhage and in cases of Jacksonian epilepsy, hemiplegia, and hemiparesis in young individuals. It is also indicated in cases in which clinical data obtained by laboratory examination or by encephaloventriculography do not permit a conclusive diagnosis as to the existing cerebral lesion.

In an arteriogram, the vasa afferentia, the angiomatous mass, and the vasa efferentia can be distinguished and an accurate analytical study should be made. According to the site, the angioma may be derived from the internal carotid, the external carotid, or both.

The arteries are usually larger than those of the opposite or unaffected side.

The afferent vessels of the angioma are easily recognized because they are larger than normal and more tortuous in their course. There is a certain relationship between the size of the angioma and the caliber of the vessels.

It is interesting to note that the afferent vessels return to their normal appearance within 2 weeks after the surgical intervention.

In the angiomatous mass, the blood vessels are of different caliber and they interlace in an irregular and complicated network, so that by arteriography the arteries cannot be distinguished from the veins. The first contrast medium picks up the very small vessels.

The contrast medium passes directly from the angiomatous mass into veins which are clearly visible. In the first exposures, the rapid visualization of the tumor is complete in 2 seconds; the medium then passes into the unusually large veins.

Angiomas are easily recognized by arteriography Possible errors in diagnosis may occur when very vascular meningiomas or glioblastomas are present.

The meningiomas appear clearly delineated with one or more peripheral arteries. The vessels of the

tumor mass are seen as an intricate network, but there is a certain regularity in the caliber of the vessels. The vessels of an angiomatous mass appear irregular in caliber.

The arteriograph of a glioblastoma is characterized by a noticeable irregularity of vascularization in the presence of an arteriovenous fistula and aneurysmal dilatation.

Early diagnosis of the presence of an angioma makes the surgical intervention easier. In order to arrive at an early diagnosis, arteriograms should be made in all cases in which angiomas are suspected clinically and roentgenologically.

The arteriographic examination should be conducted in such a manner as to permit complete reconstruction of the malformation by means of visualization of the afferent vessels, the angiomatous mass, and the efferent vessels.

With a complete arteriographic examination it is easier to interpret doubtful cases and thereby avoid diagnostic errors. BLACKWELL MARKHAM, M.D.

Mesenteric Lipoma: Report of a Case with Distinctive Roentgenographic Features. E. FRANK EVERETT and DANIEL L. FINK. *Radiology*, 1951, 56: 370.

Primary tumors originating in the mesentery are relatively rare and have been classified into two main groups, cystic and solid, the cystic type being more prevalent. Of the solid benign type, lipomas are encountered most frequently. These tumors may reach large proportions before symptoms are produced. One-third of them may show sarcomatous changes. The tumors may be multiple and the symptoms variable. The tumors may be so situated that obstruction of the bowel is produced. There may be urinary symptoms or symptoms due to torsion. Often the patient consults a physician because of a painless mass. Treatment is surgical excision.

The physical findings are also variable. Characteristically, however, there is a palpable mass with some mobility, often to the right and below the umbilicus. However, additional studies must be made to rule out the more common visceral lesions. Thus, the diagnosis is largely one of exclusion.

Roentgenographic examination is of valuable aid in the diagnosis by eliminating intrinsic gastrointestinal tumors, and lesions of the gall bladder or kidneys. The examination may also contribute to a positive diagnosis by demonstrating displacement of the viscera by a mass and a relative radiolucency in the area representing the tumor in contrast to the surrounding soft tissues. This latter finding is based on the differential absorption of the roentgen ray by fat and by tissues having a high water content.

Two cases are reported to illustrate the importance of this finding in differentiating cystic masses from lipomas. In each case, the history and physical findings were similar and there was a demonstrable mass displacing the bowel. In one of the cases, a lipoma was demonstrated by an area of increased radiolucency, and in the other, a mesenteric cyst was shown because it cast a shadow more dense than that of the surrounding tissue.

MAURICE D. SACHS, M.D.

Gastrointestinal Roentgenographic Observations in Peptic Ulcer Patients Treated by Vagotomy. CHARLES A. PRIVITERI. *Am. J. Roentg.*, 1951, 65: 561.

The author presents the effects (in 47 patients) of complete bilateral transthoracic vagotomy, without gastroenterostomy, upon peptic ulcers and upon several subdivisions of the gastrointestinal tract demonstrated by roentgen examinations. This work was done at the Veterans Administration Hospital, New York, New York. All of the patients were males between the ages of 21 and 58 years. Gastrointestinal studies immediately before operation were followed by careful clinical and roentgenological examinations after operation for 2 years. Of the 40 duodenal ulcer cases, 8 presented excellent results, 19 presented good results, and 13 were failures. Of the 7 jejunal ulcer cases, 3 presented excellent results and 4 were failures. In 36 of the duodenal ulcer cases the ulcer symptoms subsided immediately following vagotomy. The melena disappeared in all of the cases except 1, but it reappeared in 7 cases. Within 1 month, the roentgen findings in all except 11 cases showed residual deformity of the duodenal bulb or a nonvisualized bulb.

Seventeen cases were considered failures. Seven of the 17 patients had persistent ulcer and 10 of them had recurrent ulcers. Ulcers persisting for 1 year and ulcers requiring another operation were considered as failures. There were 3 cases of incomplete vagotomy, the statistics of which are not included in this report. The complications associated with the vagotomies were considered minimal. There were no deaths directly resulting from the vagotomies. Two deaths occurred, however, following later additional surgery, one from pulmonary embolism 24 hours after a partial gastrectomy made necessary to relieve the gastric atony, and the other from hepatic insufficiency 2 weeks following gastroenterostomy for the relief of gastric atony. Extensive cirrhosis of the liver was found at autopsy.

Gastric atony was the most common postoperative result of vagotomy. The majority (75 per cent) of the patients developed moderate to severe gastric atony. By the third postoperative month, gastric atony was demonstrable in only 26 per cent of all the patients. However, in these patients it took from 6 to 18 months for the re-establishment of a normal gastric tonus. The preoperative 12 hour overnight volume of gastric secretion dropped immediately after vagotomy from an average level of 970 c.c. to one of 290 c.c.

Following vagotomy, no abnormal roentgenographic changes were observed in the esophagus in 8 patients, in the gall bladder in 7 patients, and in the urinary tract in 5 patients. In the majority of the patients, the colon failed to show abnormal

changes, although in a few, irritability and hypermotility occurred concomitantly with a transient diarrhea.

In the first postoperative year the majority of the patients showed changes in the mucosa of the small intestine, with a mild to moderate degree of hypermotility in this portion of the bowel. Vagotomy achieves two conditions, decreased secretion and decreased motility of the stomach. It is the author's opinion that treatment of peptic ulcer by vagotomy without concomitant gastroenterostomy is not superior to other methods of treating this condition.

FRANK L. HUSSEY. M.D.

MISCELLANEOUS

The Pathogenesis and Treatment of the Postirradiation Syndrome. J. GARROTT ALLEN, PETER V. MOULDER, and DANIEL M. ENERSON. *J. Am. M. Ass.*, 1951, 145: 704.

The total body exposure to ionizing irradiation in atomic disaster leads to latent sequelae which constitute the postirradiation syndrome, characterized primarily by hemorrhage, infection, anemia, and malnutrition.

The authors performed numerous experiments on dogs with the purpose of finding suitable remedies for the treatment of these important disorders. The lethal $dose_{100}$ for the dog ranges between 300 and 325 roentgens and is fairly close to that anticipated for man. To eliminate the chance of spontaneous survival, an arbitrary dose of 450 roentgens was used in all experiments. Over a period of 5 years no untreated animal has survived this exposure.

Hemorrhage. The pathogenesis of postirradiation hemorrhage involves practically all of the elements of hemostasis. Thrombocytopenia is present invariably, and if the animal survives from 8 to 12 days the number of the platelets falls to less than 50,000 per cubic millimeter. There is no remedy for this hemostatic deficiency and blood transfusions are useless. The authors, by employing a careful technique, also found an increased clotting time which is most marked between the eighth and tenth days and often returns to normal terminally. The prothrombin activity is unaltered and, therefore, the value of precautionary administration of vitamin K is questionable.

The increased clotting time cannot be entirely attributed to the thrombocytopenia. There is also a circulating anticoagulant, which produces an action similar to that of heparin, and it is possible that other nonheparoid inhibitors will be found. The results of the administration of toluidine blue and protamine sulfate, which are known to form salts with the heparin and with a number of anticoagulants, are inconsistent.

There is evidence that some denaturation of the plasma proteins takes place but no attempt has been made to correct this.

Capillary hemorrhage, which is always present, may be the result of direct injury, diapedesis, or altered physiology of the "capillary wall." Rutin, ascorbic acid (vitamin C), and other related substances are recommended on general principles.

Infection. This complication accounts for many of the fatalities occurring between the second and sixth weeks. It is due to impairment of both the innate and the acquired immunization mechanisms, so that the organism becomes too exhausted to develop any protective means. The situation is aggravated by the fact that lacerations, abrasions, or burns which occur immediately after the atomic explosion, and open surfaces which form later, especially in the oral cavity and the gastrointestinal tract, constitute portals for easy entry of the contaminating micro-organisms. The severe leucopenia and the markedly reduced antibody titers reflect the grave damage done to the immunity system by the ionizing radiations. No therapeutic agent has as yet been found which could prevent or remedy this damage.

If, however, the exposure is not so severe, survival may occur even without treatment. Thus, animals given 325 roentgens or less still show the same leucopenia and thrombocytopenia, but the antibody titers are less markedly affected. In these, secondary infection does not pose such a serious problem.

The authors used aureomycin hydrochloride, which was given orally twice daily in doses of 250 mgm. each, or intravenously twice daily in doses of 100 mgm. each to animals exposed to 450 and 300 roentgens. While no significant results were obtained from the former dosage, the latter showed very definite results, although, here too, no survivors occurred. Aureomycin combined with blood transfusions produced a few survivors, thus being more beneficial than when it was administered alone.

Anemia. Acute and profound anemia always occurs following a dose of 450 roentgens if the animal survives from 10 to 14 days. Among the various factors which must be considered responsible for its causation are internal and external hemorrhage; hemolytic, phagocytic, or both types of cell destruction; and acute changes in the blood volume.

The authors believe that it is not necessary to correct or prevent completely the anemia of the postirradiation syndrome. They obtained erythrocyte counts above 4,000,000 with transfusions of 5 c.c. per kilogram given every second day beginning with the second day after exposure.

A secondary or latent anemia also develops, usually between the fourth and sixth weeks. This is treated by blood transfusions based on peripheral blood studies.

Nutrition. Except for the first day, most animals eat well for 1 or 2 weeks following exposure. After that, parenteral feeding is necessary, usually between the tenth and thirty-fifth days. Of the parenteral agents, blood is the most important, but dextrose, saline solution, and possibly the animo acid hydrolysates help to meet the fluid and caloric needs and to combat diarrhea and vomiting. The maintenance of a proper nutritional state constitutes a

very difficult problem. This is contrary to previous experience with the treatment of burns uncomplicated by irradiation, in which oral feeding is generally possible. T. LEUCUTIA, M.D.

Statistical Report of Carcinomas of the Mouth and Pharynx Treated from 1928 to 1945. Results of Radiotherapy in Carcinomas of the Base of the Tongue and the Glossoepiglottic Region (72 Cases). (Rendiconto clinico-statistico dei carcinomi della bocca e del faringe trattati dal 1928 al 1945. Risultati della radioterapia nei carcinomi della base della lingua e della regione glossoepiglottica (72 casi). CAMILLO VECCHI. *Radiol. med.*, Milano, 1951, 37: 127.

This report includes only those cases of carcinoma of the mouth and pharynx in which the primary tumor was located at the base of the tongue, at the epiglottis, or in the immediate region. The 72 cases represent all of the patients, no matter how far advanced their conditions were, who received treatment at the Radiological Institute of the University of Milan from 1928 to 1945. The diagnosis was confirmed histologically in 50 cases.

When possible, treatment consisted of doses of 1.5 to 2 millicuries per cubic centimeter of radium which was administered interstitially over a period varying from 6 to 10 days. If all portions of the tumor were not accessible roentgen therapy was supplemented. When radium could not be given interstitially roentgen therapy was instituted as the definitive treatment. Two lateral parts each received 3,000 roentgens (160 to 180 kv., with 0.5 to 1.0 mm. of copper filter) over a period of about 40 days. The patients who had glandular metastases were also subjected to radical neck surgery.

There were 36 patients without glandular metastases, of whom 30 per cent survived 3 years and 21 per cent survived 5 years. Only one patient among 15 with glandular metastases survived 3 years. Of the total of 72 patients, 18 per cent survived 3 years and 11 per cent survived 5 years.

The author believes that the results following radiotherapy compare favorably with the published surgical results, and that radiotherapy is the treatment of choice, especially when the mutilation of radical cauterization or excision is considered.

N. CHRISTIAN MEYER, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

The Growth Processes of Tumors—Acceleration and Inhibition—in the Light of Experimental and Clinical Studies (Ueber Wachstumsvorgaenge der Geschwuelste [Steigerung und Hemmung], in Experiment und Klinik gesehen). E. REHN. *Med. Welt.*, 1951, 20: 338.

The odd and frequently unexplicable manner in which a tumor suddenly starts to grow wildly and to metastasize after having lain dormant for years, and the frequently equally inexplicable manner in which it will cease to grow and even regress has forced the surgeon to take a less mechanistic view of the process of tumor growth in general.

The best understanding of the many unexplained behavior patterns of tumors is perhaps obtained by experimental and clinical studies of the hormones and the hormone milieus. In fact, the effects of many of the more mechanistic treatments are now regarded as being obtained by the intermediation of hormonal influences. The control of tumor growth by irradiation of the thymus, the pancreas, and the sympathetic chain; and the fact that tumors will cease to grow or will recede following treatment with insulin and artificial hypoglycemia; as well as the fact that some tumors which have not been removed completely, or their lymph gland metastases, will disappear following the operative insult itself are attributed by the author to a simple "stress reaction" in the Selye sense, with insult perception and defense reaction on the part of the midbrain and hormone response by way, for instance, of the suprarenal cortex (cortisone). Cortisone is often regarded as a "mitosal poison"; however, in these cases the author prefers simply to refer to a growth inhibitory reaction.

Recent studies have shown that the second hormone of the suprarenal cortex (cortisone) is an inhibitor of cell growth; however, Studer (Basel) has shown that individual tissues may react differently toward cortisone in that this substance in some tissues will act as an inhibitor of mitosis, in others it will not. The corticotrophic hormone (ACTH) has failed to influence the tumor clinically; it merely corrects the secondary disturbance effected by the tumor toxins in the suprarenal cortex.

It was while working out these conclusions that the author discovered that the female sexual hormone is capable of influencing tumor growth, even of tumors lying outside of the sexual sphere. For the clarification of this effect it must first be explained that the sexual hormones in general are regarded as growth inhibitive, the influence being effected by way of the hypophysis. The growth of the tumor and its accelerative behavior are controlled through the hypophysis, since tumor growth ceases following hypophysectomy. Since the hypophysis possesses the capacity of giving off in excess only one hormone —this speaking for a sort of preferred route of action —the repression of the growth hormone of the hypophysis by the antagonistic sex gland hormone is a natural conclusion. Thus, at the Surgical Congress in Dresden in 1943 the author reported the growth inhibitory influence of estradiol benzoate (Schering) on papilloma of the urinary bladder. Some years later he was able with estradiol to cure by means of estradiol, under constant cystoscopic control, a carcinoma of the bladder in a postclimacteric woman. The same type of bladder cancer in a young woman responded to estradiol treatment, despite roentgen castration, by an acceleration of growth.

Thus, it seems that the influence of this hormone on tumors depends absolutely upon the hormonal milieu present at the time. The principle of antagonism seems to be of significance. Further evidence of the effectiveness of the principle of antagonism in these tumor-hormonal relationships is borne out by the fact that the author has been able to effect growth inhibition in a melanosarcoma by estradiol therapy in a male before the male climacterium.

The best known use of the female sexual hormone is against cancer although why this substance should inhibit the growth of cancer in the prostate and yet cause an occasional cancer in the breast of the same patient is still a mystery. This hormone also seems to lose its efficacy because very few of the patients under such treatment actually survive the 5 year period. There is still, however, a great deal to be learned about dosage, and Raabe in the author's laboratory has been working continuously on the problem of the control of acid phosphatase.

All in all, the process of growth acceleration of the malignant tumor, whereby it emerges from its state of latency, and also the phenomena of growth inhibition are indications of a susceptibility of the tumor cells to modification of their biologic behavior. There is evidence of hormonal influence on this behavior. The possibility and significance of therapeutic exploitation of this susceptibility seems to reside in the fact that reactions may be stimulated which the organism itself had been using during this latent period. JOHN W. BRENNAN, M.D.

Concerning Melanotic Tumors of the Head Region (Sui tumori melanotici delle mucose dell'estremo cefalico). FEDERICO PIZZETTI, GIANBATTISTA LEONARDELLI, and CARLO PASINI. *Tumori*, Milano, 1950, 24: 315.

Five personal observations of malignant melanotic tumors of the head region are reported. Two of these tumors occurred in the nasal fossae, 1 in the maxillary sinus, 1 on the hard palate, and 1 in the conjunctiva of the left eye. The 2 patients with the nasal tumors were rather young (29 and 38

years, respectively) for this type of tumor. The first one was already inoperable and died without surgical treatment; the second, whose tumor seemed to have taken origin in the labyrinth, has remained well after extensive surgical demolition and has been free from recurrence for about 2 years.

In the case of the maxillary sinus tumor, the authors feel certain that the origin of this neoplasm was in the sinus itself. There was also extensive demolition in the treatment of this patient; however, the ultimate result could not be assessed at the time of this report because the case was followed up for only 2 months after the operation.

The tumor on the hard palate had a long history. In 1931 the pigmented patch was first noted in the center of the hard palate. The spot began to enlarge in 1945, but had still not reached the size of a 5 cent piece in 1948 when trauma seemed to provide a stimulus to rapid growth. Biopsy at this time disclosed a melanoma, poor in pigment, carcinomatous in structure, and with indications of salivary gland formations. Wide removal of the tumor mass and the neighboring tissues with electrocauterization of the base did not prevent recurrence in the inframandibular lymph glands a year later.

The remarkable thing about the conjunctival tumor was the relative benignity of the new growth with the histological picture of typical malignant melanoma. The neoplasm showed an unmistakable response to hormonal influences; it was removed 3 times following recurrences which developed during corresponding pregnancies. It is thought that this peculiar response justifies further clinicostatistical and experimental study in an effort to clarify the relationships existing in the human subject between the genesis of pigment and endocrine influences.

On the whole, the only hope known at present for patients with these tumors is early and radical surgery. The tumors do not seem to be sensitive to irradiation, although the pigment spots from which they seem to originate are sensitive. There should be frequent control of all melanotic spots, with readiness to intervene at the first indication of malignant degeneration with all the resources of modern electrosurgery. Postoperative irradiation treatment need not, of course, be abandoned.

In a preceding article (Pizzetti and Leonardelli. *Tumori*, 1950, 36: 284) with reference to the physiopathology of the pigment-producing apparatus of the body, two of the present authors reported that malignant melanoma of extracutaneous location represents only 7 per cent of all melanoma localizations. JOHN W. BRENNAN, M.D.

Pheochromocytomas and Paroxysmal Hypertension (Feocromocitomi e ipertensione parossistica). BRUNO MALANDRA. *Tumori*, Milano, 1950, 24: 332.

A woman who appeared to be about 51 years of age arrived at the hospital in coma and died the next day without regaining consciousness. Nothing could be learned of her past history or of the history of the present attack. The clinical diagnosis was arterial hypertension (essential?) and acute pulmonary edema.

Autopsy disclosed cardiac hypertrophy, some arteriosclerosis of the abdominal aorta, a congested and edematous pulmonary apparatus, and a tumor nodule in each of three different organs (right and left suprarenal glands, and the hypophysis).

The tumor in the left suprarenal gland was a typical pheochromocytoma, the size of an apple, surrounded by remnants of the original gland and with a broken-down, structureless, hemorrhagic central area. The mass was well encapsulated and offered no evidence of infiltrative tendencies or of adhesion to the surrounding organs. The nodule in the anterior hypophyseal lobe was tiny in size (less than 1 mm. in long diameter). The nodule was not, or only very slightly, encapsulated and revealed the histologic characteristics of the chromophobe tumors of Coster and Berdet, and of Del Rio-Hortega. The nodule in the right suprarenal gland was located just under the capsule in the cortex, was very tiny (0.690 mm. in long diameter), and showed the general histologic characteristics of the cortex itself (cortical hyperplasia).

A fragment of the left suprarenal tumor gave a powerful reaction to adrenalin by the method of Meltzer and Ehrmann (isolated eye of the frog).

In the absence of complete clinical studies on the patient prior to her last illness, the author cannot do more than speculate on the possible relationship between the tumor of the suprarenal gland (pheochromocytoma) and the nodule in the hypophysis; however, he thinks the latter finding might help to explain those instances in which the pheochromocytoma would be expected to produce hypertensive phenomena and yet does not do so.

JOHN W. BRENNAN, M.D.

Sacrococcygeal Teratoma. Review of the Literature; Report of Teratoma (in an Adult) Containing a Glomus. LOUIS T. PALUMBO, K. R. CROSS, and R. E. PAUL. *Ann. Surg.*, 1951, 133: 421.

A review of the literature revealed a frequent interchange of terminology of dermoid cyst and teratoma, and in most instances in which the term "dermoid cyst" was used, the tumor was a true teratoma.

Sacrococcygeal teratoma is rare in the adult and is usually discovered at birth or in early postnatal life. These tumors originate either dorsal or ventral to the sacrum, and usually cause secondary symptoms (due to pressure by the growing mass) such as disturbances in micturation, defecation, backache, and sciatica. Roentgenograms of the pelvis may reveal bone or teeth within the tumor, or erosion of neighboring structures.

Surgical removal is the treatment of choice and is usually required to establish a diagnosis. The prognosis is good if the tumor can be completely extirpated.

The mortality rate reported in the literature, among patients operated upon from 1930 to 1939,

was 33.3 per cent. A 9 per cent incidence of malignancy was reported.

The authors present the case of a 35 year old white male with a sacrococcygeal teratoma, unusual because of its great size, and because it contained a glomus—a previously unreported finding. The tumor was successfully excised, and the patient was reported well, without recurrence 18 months after the operation. JACOB T. BRADSHER, JR., M.D.

Melanocarcinoma of the Plantar Surface of the Foot; A Review of 25 Cases. ALFRED M. DECKER and JAMES T. CHAMNESS. *Surgery*, 1951, 29: 731.

This case study of 25 malignant melanomas apparently substantiates the observation that variations in behavior of the same histologic type of malignant tumor in different sites of origin occur. There were 11 men, one of whom was a negro, and 14 women. The lesions were well distributed in location, 10 being on the metatarsal area or ball of the foot, 10 on the heel, 3 on the instep, 1 over the entire sole, and 1 not located in its description. The gross appearance of the primary lesion was frequently not suggestive of melanoma.

In all, 142 plantar lesions were excised or biopsied. Forty-three, or 30 per cent of these, including the 25 melanocarcinomas, were malignant. The other malignant lesions consisted of 10 squamous-cell carcinomas, 2 sweat gland carcinomas, 1 basal-cell carcinoma, 2 liposarcomas, 2 fibrosarcomas, and 1 Kaposi's sarcoma.

It was seen that nonpigmented lesions were most commonly misdiagnosed before operation, and therefore badly handled if malignant. Fourteen of the 25 patients had clinically apparent metastases in the inguinal lymph nodes which were confirmed microscopically after resection or biopsy.

Of the 25 patients, 19 have died of melanocarcinomatosis. In 8 cases the lesions were inoperable when first seen. None of these 8 patients survived as long as 2 years from the time they were seen, but 1 patient had survived 10 years and 2 patients had survived 15 years from the time the original lesions were first treated elsewhere. Of 17 patients treated both locally and with inguinal node dissection, only 1 is living without apparent disease over 6 years after therapy. Four other similarly treated patients are living without evidence of disease 18, 12, 7, and 6 months after therapy. One patient is alive but with evident metastases 14 months after treatment. Eleven have died of melanocarcinomatosis 4 to 55 months after inguinal node dissection averaging 22 months' survival.

It is thought that all patients with proved melanocarcinoma of the lower extremity, with or without palpably enlarged inguinal nodes, should be subjected to radical inguinal dissection if there is no evidence of other incurable metastases. The dissection should succeed local excision or amputation of the primary neoplasm. Irradiation therapy is not indicated as a primary treatment of melanocarcinoma. STEPHEN A. ZIEMAN, M.D.

EXPERIMENTAL SURGERY

Experimental Contribution to the Study of Pulmonary Emboli (Contributo sperimentale allo studio dell'embolia polmonare). V. E. STAUDACHER and A. PULIN. *Chirurgia*, Milano, 1950, 5: 195.

Experiments were conducted on 95 dogs and 10 rabbits. Emboli were prepared by allowing blood to coagulate in glass tubes of varying sizes and lengths for a period of 2 to 4 hours. These were injected into the jugular vein by applying pressure through a rubber bulb with precautions not to force air into the circulation. In a second group of cases licopodium spores were used as emboli. Varying amounts of the lungs were involved according to the size and number of emboli.

The results obtained could always be explained on a mathematical hemodynamic basis. In order to produce blood pressure changes, at least 50 per cent of the pulmonary circulation had to be occluded. None of the changes could be explained on a reflex basis.

In trying to correlate these findings with results in human beings, the authors concluded that massive emboli cause massive vascular changes and death. Other types of death due to smaller emboli are explained on the assumption that there may be a latent cardiac insufficiency unveiled by the hemodynamic changes due to emboli in the pulmonary arterial branches. LUCIAN J. FRONDUTI, M.D.

Liver as a Factor in Experimental Renal Hypertension. LOYAL DAVIS and CARLOS A. TANTURI. *Arch. Surg.*, 1951, 62: 325.

The authors investigated the role of reduction of the arterial supply to the liver in hypertensive dogs as it applies to the effect on blood pressure. It is apparent that occlusion of the entire arterial supply to the liver in hypertensive dogs produces only a temporary drop in blood pressure. This change is accompanied by a mild degree of liver insufficiency, as shown by hypoprothrombinemia, hypoproteinemia, and decreased hematocrit levels. After a variable period, the blood pressure resumed its hypertensive level and the blood chemistry returned to normal. It is known that there is a reciprocal relation between the blood flow in the hepatic artery and that in the portal vein, and these changes in the blood pressure and blood chemistry may be explained by the interval of time necessary for the portal vein blood flow to compensate for the absence of the arterial blood supply.

It was the experience of the investigators that when partial occlusion of the portal vein failed to reduce blood pressure in hypertensive dogs, it was because of the disproportion between the small size of the vein and lumen of the Goldblatt clamp used to partially obliterate the portal vein blood flow. Observation of cyanosis of the intestine is not a completely reliable method of determining the efficient degree of partial occlusion of the portal vein, so that some failures in reducing the blood pressure

occur. In readjusting the Goldblatt clamp, the authors found no certain method of insuring the survival of the animal. In each instance, no evidence of an intrabdominal collateral venous circulation was found which supported the opinion that a mild insufficiency of the liver must be established in order to reduce the systemic blood pressure in the hypertensive animal. Although the blood chemistry changes did not indicate the marked insufficiency in the liver to be expected when both the hepatic artery and the portal vein are partially occluded, the fact remains that this procedure, in the experiments performed by these authors, invariably produced a reduction in the systemic blood pressure in the hypertensive dog.

To rule out the possibility that the decline in the systemic blood pressure observed in these experiments was due to an accumulation of blood in the splanchnic area, as the result of the increased portal circulation, portocaval shunts were performed on those animals both with partial occlusion of the portal vein and also those with partial occlusion of both the portal vein and hepatic artery. This procedure did not alter the sustained reduction of the systemic blood pressure, but did improve the general condition of the animal.

The reduction in systemic blood pressure observed in these experiments does not occur immediately after partial occlusion of the portal vein, which suggests an indirect rather than a direct participation in the mechanism controlling the systemic blood pressure.

These results also point out that the liver plays a role in the humoral mechanism involved in the experimental renal hypertension, and lends support to the two current theories which have been proposed to explain the mechanism of experimental renal hypertension. ORVILLE F. GRIMES, M.D.

Therapeutic Possibilities of Grafting Cultivated Embryonic Tissues in Man. The Parathyroid Gland in Cases of Postoperative Tetany. P. J. KOOREMAN and P. J. GAILLARD. *Arch. chir. Neerl.*, 1950, 2: 326.

The authors present the results of their study of the grafting of parathyroid tissue in humans. The parathyroid gland tissue was derived from full term newborn babies and was cultivated as described by the authors. After 14 to 21 days' cultivation, the explants were ready for transplantation.

The grafts were placed in the perivascular space about the axillary artery through an incision, under local anesthesia, in the upper arm. The patients were confined to bed for 7 days after operation with the arm held in abduction.

Forty-two parathyroid grafts were made in 29 patients; several patients were operated upon several times. All but 2 of the patients had postoperative tetany; the two exceptions had idiopathic tetany. The cases are described in the original article. The results in several patients were not judged, leaving 21 with postoperative tetany and 1 with spontaneous tetany, which were judged.

There were 7 successful transplantations with observation periods of between 3 and 8 years after implantation. The possibility of a successful transplant decreased with advancing age, and repeated transplantations were sometimes necessary to secure a positive result. The authors do not believe that the results give detailed information on the role of cultivating the tissues before transplanting them.

DONALD C. GEIST, M.D.